IMMPA: Integrated Macroeconomic Model for Poverty Analysis

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Part 1: "The Big Picture"

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- **Why build a (relatively) complex model?**
- **IMMPA: main features.**
- Calibration and solution of the IMMPA prototype for low-income countries.
- Modifications and extensions.
- IMMPA prototype for middle-income countries: the case of Brazil (re-specification of financial system; bond financing).
- Policy exercise: debt relief, public expenditure allocation, and poverty reduction.

Why build
a (relatively) complex model?

- Issue is complex; it serves no good purpose to pretend that it is not.
- Existing, commonly-used policy tools do not come anywhere close to capturing some of the most important channels through which exogenous and policy shocks are transmitted to the poor.
- Models are issue-specific; trying to “force” a model to answer questions that it is not designed to address hampers our ability to address relevant policy questions (North-American tradition).

- Models are not built only to produce numbers but also to provide qualitative insights (general equilibrium effects).

- Before looking for “shortcuts”, one needs a **conceptual roadmap** to understand the costs and benefits of simplification.

- Lack of skills is indeed a constraint in many cases; but many middle-income countries, and some low-income countries, have the capacity to implement the model.

- Lack of adequate data: also a problem. But do you wait until the data have improved sufficiently, or do you start with existing data, no matter how imperfect, and improve the database gradually?

IMMPA: Main Features

- Treatment of the **production structure** and the **labor market** (wage formation and sources of segmentation, skills acquisition, rural-urban migration).

- The financial system and the **credit market** (portfolio structure – stock decisions – and the treatment of credit market imperfections).

- Adverse effect of **external debt** on domestic private investment (foreign exchange constraint, confiscation risk, or other channels).

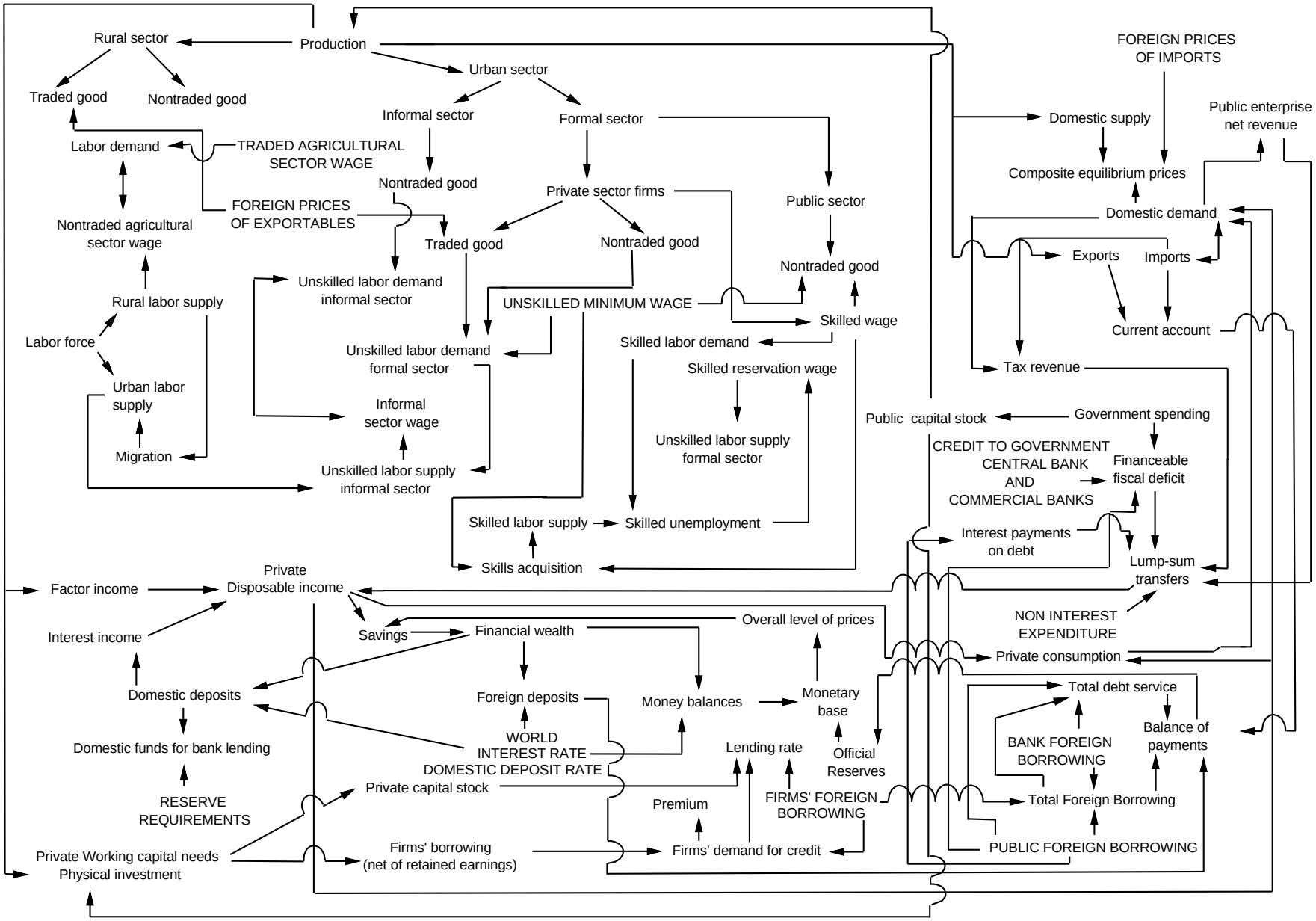
- Allocation of **public expenditure** (to current transfers, infrastructure, education, health).

- Systematic link with a household **income and expenditure survey**; allows a more accurate assessment of poverty effects of shocks.

- Dynamic structure allows the analysis of **dynamic tradeoffs** that poverty-reduction strategies may entail regarding the sequencing of policy reforms – particularly between short-term stabilization policies and structural measures.

Structure of IMMPA

Figure -. IMMPA: Analytical Structure



Note: Exogenous variables are in capital letters.

Poverty and Income Distribution Analysis

A. Measures of **income distribution**:

- Gini coefficient and Theil index.
- Based on **six** households categories: workers in the rural traded sector, rural non-traded sector, urban unskilled informal economy, urban unskilled formal sector, urban skilled formal sector; and capitalists.
- Other measures can be added.

B. Link with **household surveys**:

- IMMPA simulation results can be linked to survey data on income and expenditure…
- ...to estimate the impact of shocks on income within each group as well as average income variations among groups.
- This allows us to calculate measures of poverty and changes in income distribution **across** groups.

Approach:

- **Step 1**. Use the information provided in the household survey to classify the available sample into IMMPA's six categories of households, so as to establish an interface between the model's simulation results and actual household income and expenses.

- **Step 2**. Following a shock to the model, calculate real growth rates in per capita consumption and disposable income for the six categories of households.

- **Step 3**. Apply these growth rates separately to each individual per capita (disposable) income and consumption expenditure observation in each of the six groups of households in the survey…

- …this gives absolute income and consumption levels for each household, in each group, following the shock.

- **Step 4**. Given rural and urban poverty lines (expressed in monetary units and rising at the rural and urban unskilled CPI growth rates), and using the new absolute levels of income and consumption in each group, calculate:

  - Post-shock poverty indicators (headcount index and poverty gap index);

  - Income distribution indicators (Gini coefficient and Theil inequality index).

- **Step 5**. Compare post-shock indicators with baseline values to assess impact of the shock on poverty and income distribution.

- For all indicators, IMMPA generates three measures: *short-term* measure (first two periods following a shock); *medium-term* measure (between 3 and 5 periods); and *long-term* measure (6 and 10 periods).

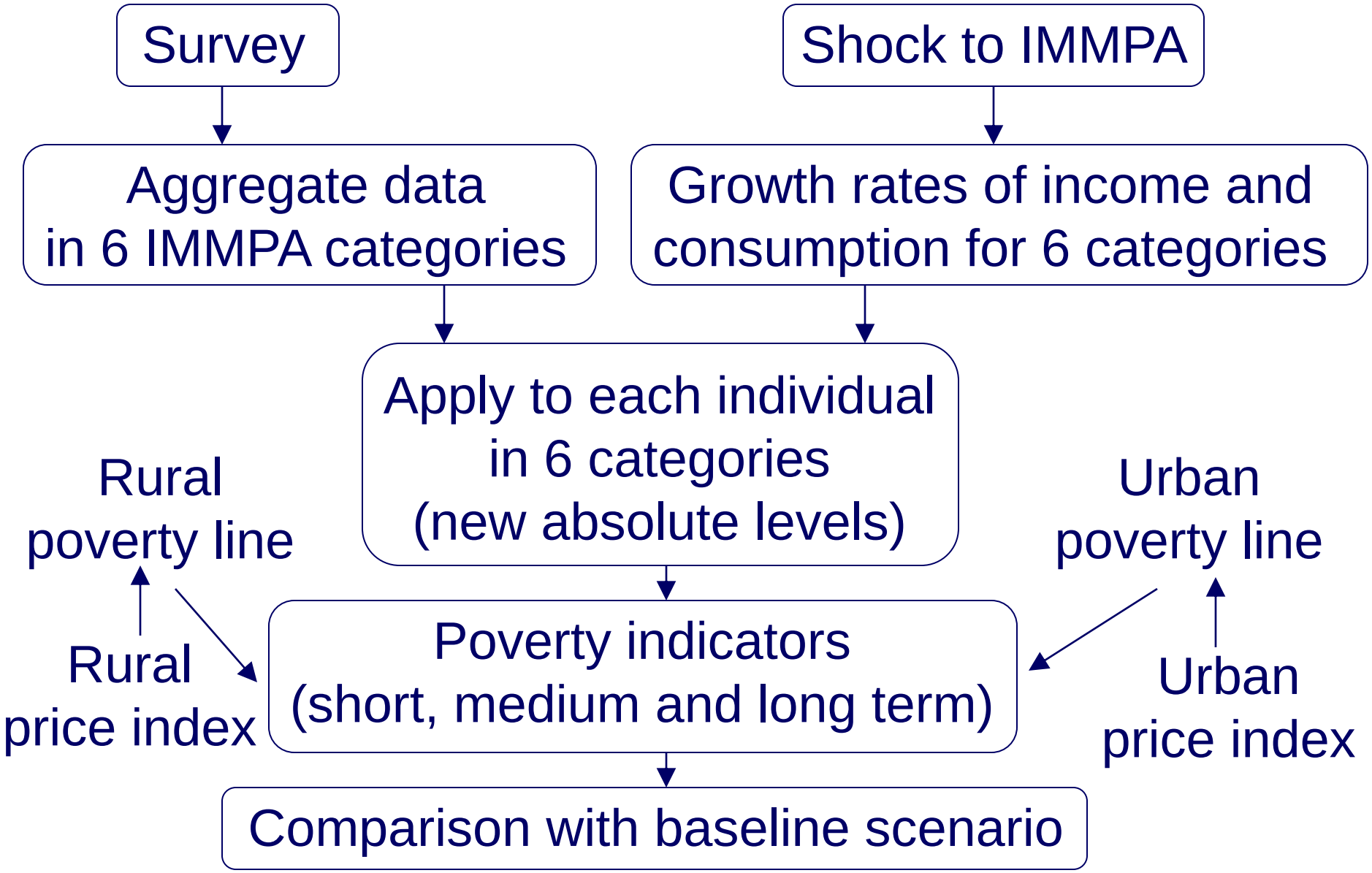
- Choice of intervals is somewhat arbitrary and can be changed.

- These measures allow the analyst to identify and discuss possible **dynamic tradeoffs** in the analysis of policy choices, by contrasting their short- and longer-run effects on the poor and income distribution.

Note I: Limitations of Headcount index

- 1. Does not indicate how poor the poor really are (it remains unchanged even if all people with incomes below the poverty line were to experience e.g. a 50% drop in income).
- Put differently: when a poor person become poorer, the index will not increase.
- 2. Implies that income distribution among the poor is **homogeneous** (no distinction between a poor person who earns one monetary unit less than the poverty line and one who earns 100 monetary units less than the poverty line).

Link IMMPA-Household Survey



Poverty Sheet - Consumption Based

Microsoft Excel - endog-graphs.xls

	A	J	K	L	M	N	O	P	Q	R	S	T
1	CONSTRUCTED VARIABLES	6	7	8	9	10	11	12	13	14	15	16
2	variable name											
43							Initial	Short-Run	Medium-Run	Long-Run		
44	Rural Poverty Line					Rural Poverty Line	0.4	0.40907816	0.4075	0.4071		
45	Urban Poverty Line					Urban Poverty Line	0.46	0.47860235	0.4775	0.4790		
46												
47		Base					Current					
48	Poverty Shares (CONSUMPTION)	Initial	Short-Run	Medium-Run	Long-Run		Initial	Short-Run	Medium-Run	Long-Run		
49	Poor_AN	0.9109	0.8931	0.8931	0.8950		0.9109	0.8891	0.8891	0.8911		
50	Poor_AT	0.4400	0.4280	0.4300	0.4300		0.4400	0.4260	0.4280	0.4260		
51	Poor_R	0.6766	0.6617	0.6627	0.6637		0.6766	0.6587	0.6597	0.6597		
52												
53	Poor_UI	0.9353	0.9235	0.9235	0.9118		0.9353	0.9235	0.9235	0.9118		
54	Poor_UF	0.1491	0.1404	0.1140	0.1140		0.1491	0.1491	0.1404	0.1140		
55	Poor_UU	0.6197	0.6092	0.5986	0.5915		0.6197	0.6127	0.6092	0.5915		
56												
57	Poor_S	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000		
58	Poor_KAP	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000		
59	Poor_U	0.3964	0.3896	0.3829	0.3784		0.3964	0.3919	0.3896	0.3784		
60												
61	Poor_Economy	0.5908	0.5783	0.5769	0.5763		0.5908	0.5769	0.5769	0.5735		
62												
63		Base					Current					
64	Poverty Gap Indices (CONSUMPTION)	Initial	Short-Run	Medium-Run	Long-Run		Initial	Short-Run	Medium-Run	Long-Run		
65	PG_AN	0.4870	0.4685	0.4691	0.4700		0.4870	0.4631	0.4669	0.4669		
66	PG_AT	0.2836	0.2825	0.2826	0.2825		0.2836	0.2796	0.2814	0.2826		
67	PG_R	0.4212	0.4087	0.4089	0.4096		0.4212	0.4040	0.4070	0.4076		
68												
69	PG_UI	0.5072	0.4861	0.4811	0.4803		0.5072	0.4800	0.4798	0.4776		
70	PG_UF	0.2019	0.2023	0.2313	0.2247		0.2019	0.2034	0.1954	0.2316		
71	PG_UU	0.4777	0.4599	0.4620	0.4605		0.4777	0.4530	0.4535	0.4585		
72												
73	PG_S	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000		
74	PG_KAP	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000		
75	PG_U	0.4777	0.4599	0.4620	0.4605		0.4777	0.4530	0.4535	0.4585		
76												
77	PG_Economy	0.4279	0.4139	0.4140	0.4138		0.4279	0.4089	0.4111	0.4120		
78												
79												
80												
81												

DEMAND / TRADE / PRICES / INCOME / FINANCIAL / PUBLIC / GrowthRates / PovertyCON / PovertyINC / IncomeDist

Ready

Note II:

- Procedure above: assumes that the user matches households as defined in the macro component of IMMPA and a household survey using information on the main source of income of **household heads**.

- Alternative treatment: possible if the household survey provides sufficient detail regarding the composition of income **among individual members** of each household.

- “Light surveys” tend to concentrate on the household head, whereas more in-depth surveys provide richer information.

- If the information is detailed enough, and if each member of a household can be “allocated” to one of the six IMMPA income groups, model-generated growth rates of income and consumption can be applied separately to each individual income-earner (as in **Step 3** above).

- Poverty and income indicators can be generated using either “individual” income earners or “composite” households.

- However, whether accounting for heterogeneity in the sources of income among individual household members makes a difference or not is generally case specific; it depends on

  - the characteristics of the intra-household distribution of income (which depends on risk diversification strategies);

  - the extent to which growth rates of income and consumption generated by IMMPA following a shock differ among the various income groups.

- If, for instance, the intra-household distribution as given in the survey is such that most of the income of each composite unit is generated by the household head…

- …treating the household as a homogeneous unit and applying the same growth rate of income to each member should not result in significant errors.

Note III:

- Approach remains subject to the assumption of a stable **within-group** distribution (relative income and consumption levels – and positions – within each group do not change because same growth rate is applied to each individual).

- Alternative approach: include individual data directly in the model and use **micro simulation techniques** to exploit intra-group information.

- Benefit: allows the analyst to distinguish, in the evolution of poverty indicators, the specific contribution of three factors: changes in the poverty line (when it is treated as endogenous), across-group variations, and changes in intra-group distribution.

- However, complex and costly to implement.

- Existing studies: not obvious that changes in intra-group distribution are large compared to inter-group distribution (results appear to be shock-specific).

End of Lecture 1

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