FINANCING GENDER EQUALITY: A MACROECONOMIC AND DISTRIBUTIONAL IMPACT ASSESSMENT OF ALTERNATIVE METHODS OF FINANCING EARLY CHILDHOOD EDUCATION IN RWANDA

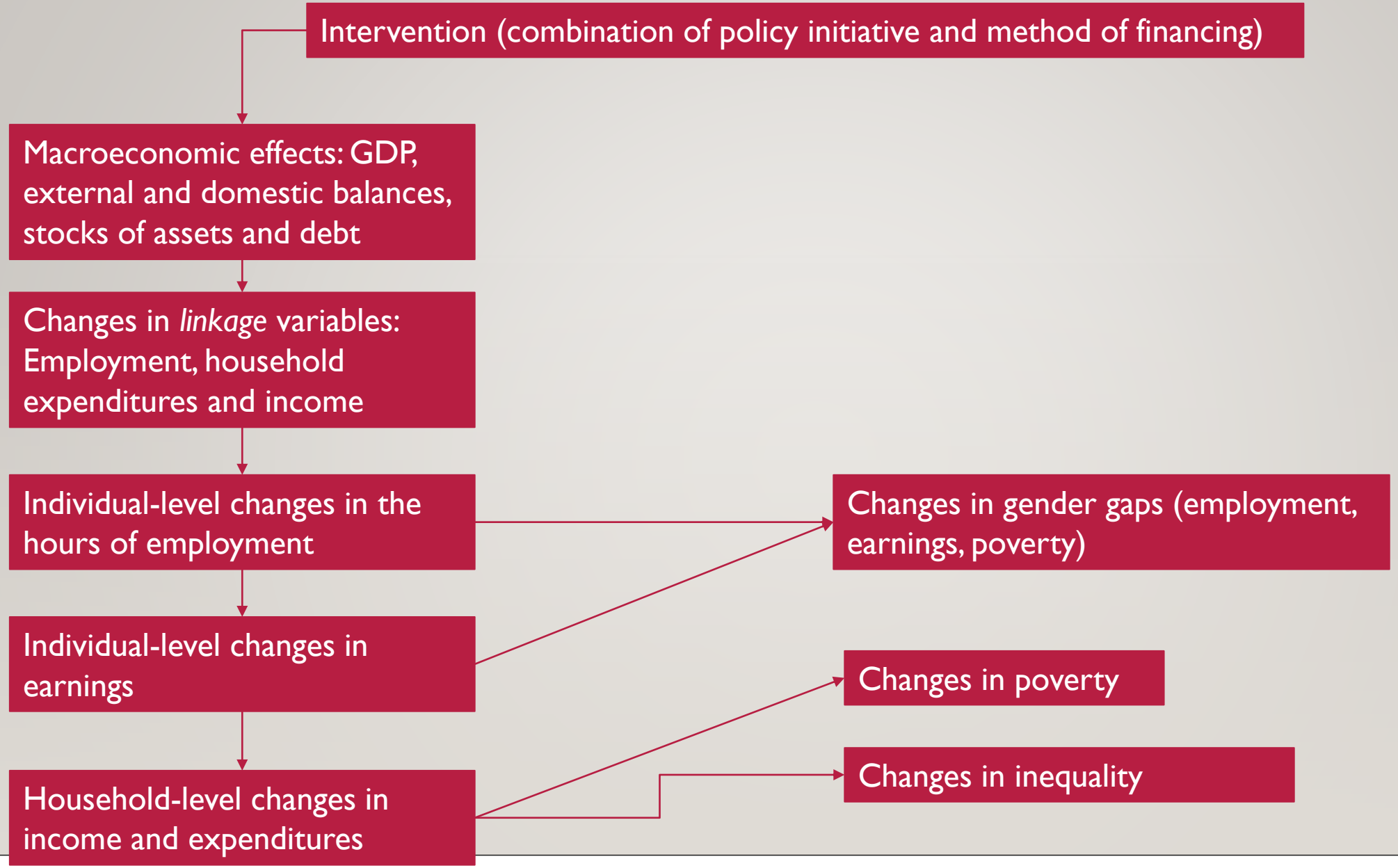
A STUDY FOR UN WOMEN

OCTOBER 22, 2026

Ajit Zacharias, Gennaro Zezza and Thomas Masterson
Levy Economics Institute

MOTIVATION

- Examine the impacts of alternative financing methods (e.g., tax financing vs. foreign borrowing) on the outcomes of ECE expansion
- The Input-Output (I-O) component of the macro model is embedded within a Social Accounting Matrix (SAM)
- Fuller picture of the distributional impacts
- A comprehensive model that can assess the macroeconomic and distributional outcomes associated with different methods of financing gender-equitable interventions


Intervention (combination of policy initiative and method of financing)
Macroeconomic effects: GDP, external and domestic balances, stocks of assets and debt
Changes in *linkage* variables: Employment, household expenditures and income
Individual-level changes in the hours of employment
Individual-level changes in earnings
Household-level changes in income and expenditures
Changes in gender gaps (employment, earnings, poverty)
Changes in poverty
Changes in inequality

KEY POLICY GOALS

Line	Indicator	Baseline 2023-2024	Target 2028-2029	Change from baseline
1	**Enrollment in preprimary schools**			
2	Net enrollment rate (%)	45%	65%	
3	**Number of pupils**	605,229	1,291,098	685,869
4	Number in schools	605,229	874,814	269,585
5	Number in ECDs	0	416,284	416,284
6	**Number of ECDs with preprimary education**	0	4,625	4,625
7	**Number of teachers**	10,898	35,333	24,435
8	Number in schools	10,898[3]	26,082	15,184
9	Number in ECDs	0	9,251	9,251
10	Pupils-to-teacher ratio	56	37	PTR = 30
11	Schools	56	34	
12	ECDs	N.A.	45	
13	**Number of trained teachers in schools**	5,736[4]	19,213	13,477
14	Pupils-to-trained-teacher ratio (PTTR) in schools	106	46	PTTR = 32
15	Pupils-to-trained-teacher ratio (PTTR) in ECDs[8]	N.A.	45	

WHAT WE WOULD LIKE TO HAVE…

- A transaction matrix, providing time-series data for key elements in a SAM
- The Flow-of-funds matrices showing the sources and uses of funds for industries and institutions, over the same time horizon
- The corresponding balance sheet matrices

WHAT IS AVAILABLE…

- Integrated macroeconomic accounts (not for Rwanda!). In most cases they don't match payers to payees, or debtors to creditors
- Balance of payments and International Investment Positions
- Government accounts (published with a different methodology)
- Statistics on financial institutions

INTEGRATION OF THE ECE SECTOR INTO THE SAM

- 2022 Social Accounting Matrix (SAM) published by the International Food Policy Research Institute (IFPRI)
- The IFPRI SAM has 42 industries. We incorporate the ECE sector as the 43rd industry.
- The ECE sector
  - uses intermediate inputs from 17 industries
  - employs two categories of workers, differentiated by their level of education (preprimary teachers as "high-education" and support staff as "low/medium" education)
  - in contrast to government documents, we assume that the new workers in the ECDs are paid workers and not volunteers

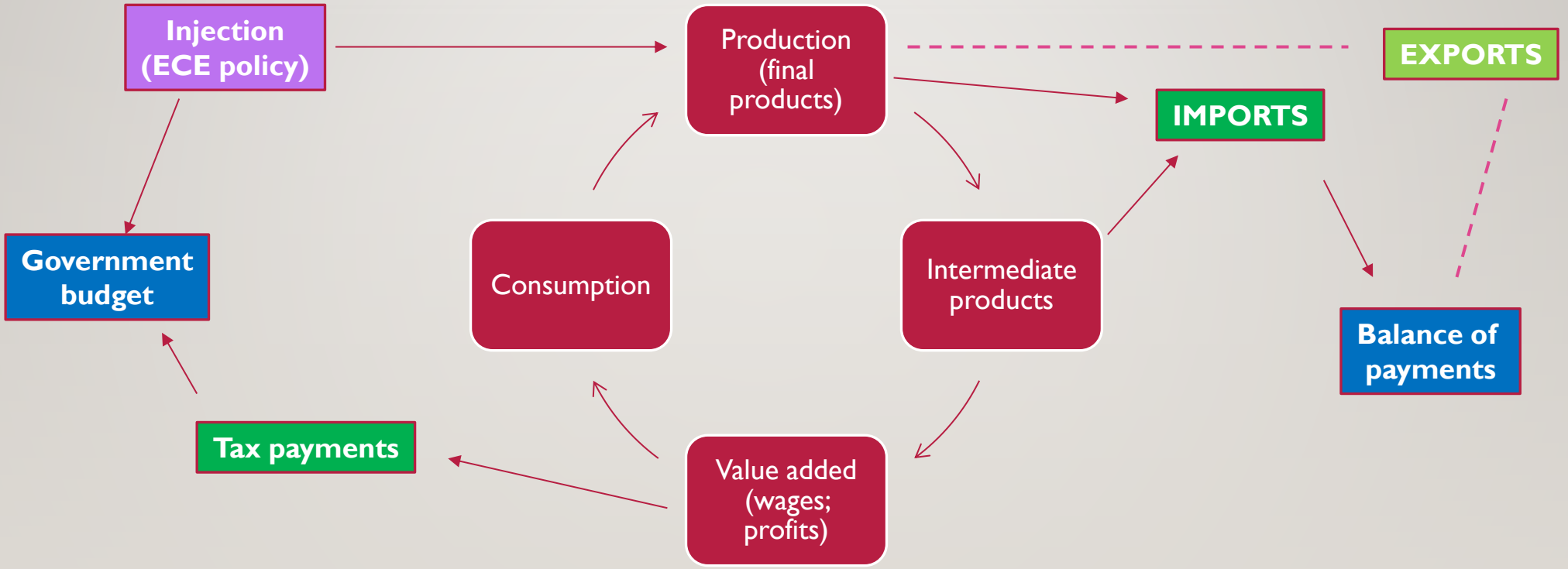
MODEL STRUCTURE

- INDUSTRIES: Based on the SAM. 42 activities – 42 commodities;
- FACTORS OF PRODUCTION: 3 types of labor, land, capital
- INSTITUTIONS: Rural and urban households by quintiles; Enterprises; Government; Rest of the World
- Imports and exports by industry
- Accounting equilibrium between saving and investment
- 1,545 equations; 2,852 variables

MODEL CLOSURE

- A Keynes+Leontiev approach
  - Investment decisions autonomous;
  - Consumption decision based on constant propensities
  - Production adjusts to demand
  - Saving adjust endogenously
- No impact of the ECE policy on prices or wages
  - Employment depends on the level of production
- We don't assume full employment
- Other closures have been explored

MODEL BEHAVIOUR



SCENARIOS: ALTERNATIVE FINANCING SOURCES

Alternative financing scenarios and changes in exogenous final demand over the five-year plan
(all amounts are in billions of FRW)

Scenario	Financing	Assumption	Liquidity needed by the government	Government				ROW	DD stimulus (net)
				Final DD	Transfers to domestic private sector	Direct taxes	Transfers to foriegners		
1	Printing money	CB financing	145	240	0	0	0	0	240
2	Direct taxes	Urban residents and the rural rich	145	240	0	-145	0	0	95
3	Domestic bonds	20-year bonds @13.1%	95	240	95	0	0	0	335
4	Foreign aid	31-year IDA credit @1.28% plus service charge @ 0.75%	29	240	0	0	-29	0	211
5	Foreign aid + exports	IDA-financing with constant exports/output ratios	29	240	0	0	-29	360	571

Note: DD stimulus is the sum of Government and ROW columns

Note: Plan period is 2024-25 to 2028-2029

COSTING OF GOALS IN PREPRIMARY EDUCATION:

CUMULATIVE CHANGE FROM THE BASELINE OVER THE PLAN PERIOD (2024-25 TO 2028-29, RWF)

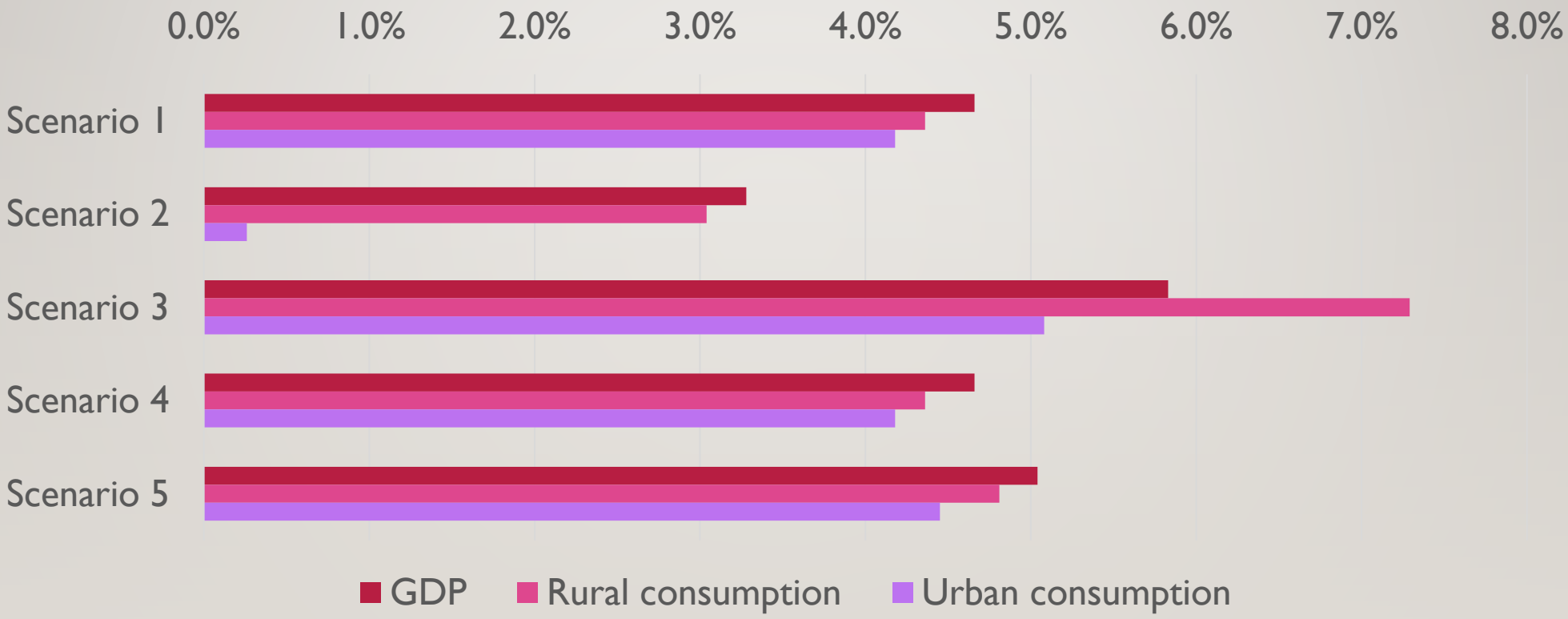
Expenditure item	Amount (billion RWF)	Share of total cost (%)
Total	481	100
Gross investment	321	67
Intermediate inputs	104	22
Employee compensation	56	12

Note: totals may not add up due to rounding

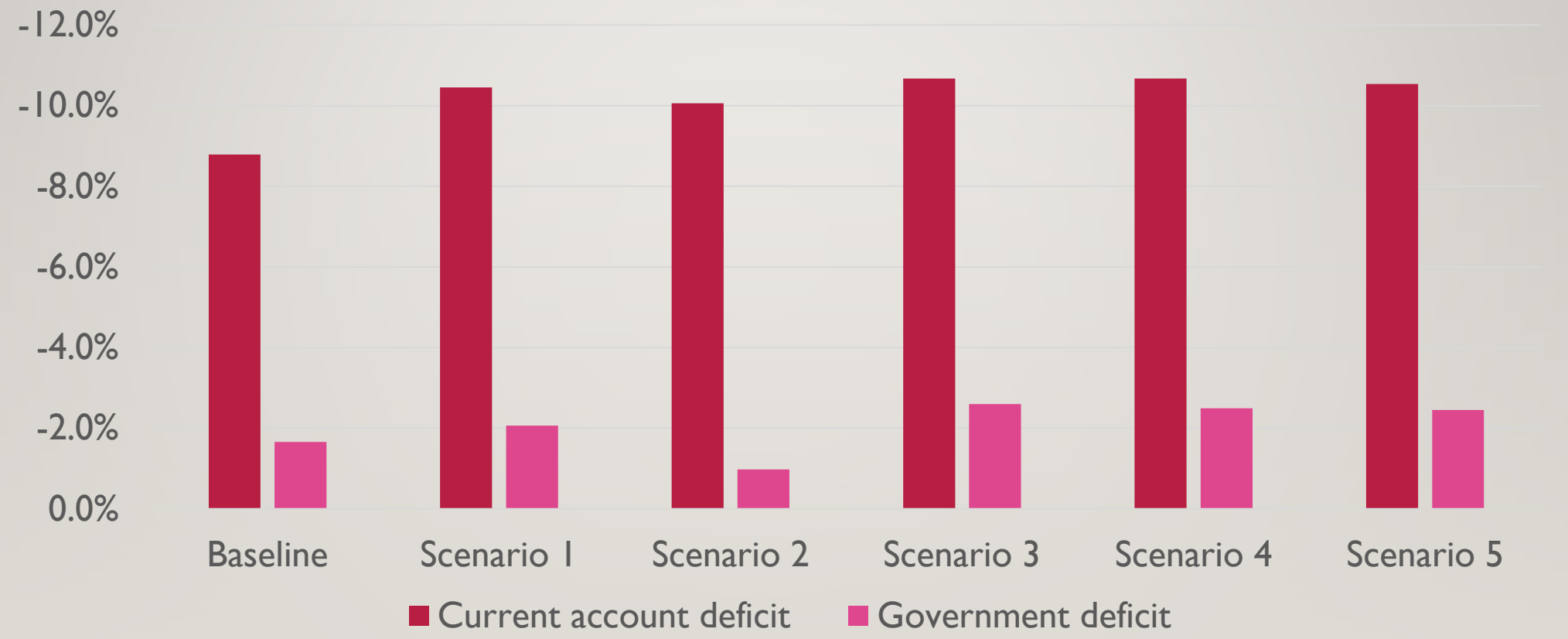
ALTERNATIVE FINANCING SCENARIOS AND CHANGES IN EXOGENOUS FINAL DEMAND OVER THE FIVE-YEAR PLAN (BILLIONS OF FRW)

Scenario	Financing	Assumption	Liquidity needed by the government	Government				ROW	DD stimulus (net)
				Final DD	Transfers to domestic private sector	Direct taxes	Transfers to foreigners		
1	Printing money	CB financing	145	481	0	0	0	0	481
2	Direct taxes	Urban residents and the rural rich	145	481	0	-145	0	0	336
3	Domestic bonds	20-year bonds @13.1%	95	481	95	0	0	0	576
4	Foreign aid	31-year IDA credit @1.28% plus service charge @ 0.75%	29	481	0	0	-29	0	452
5	Foreign aid + exports	IDA-financing with constant exports/output ratios	29	481	0	0	-29	360	812

GROWTH IN GDP AND AGGREGATE CONSUMPTION
(% CHANGE RELATIVE TO THE BASELINE)



GOVERNMENT AND CURRENT ACCOUNT DEFICIT
(% OF GDP)



DISTRIBUTIVE IMPACTS: DATA AND METHODS

- Outputs from the macro model by scenario
  - Changes in employment by industry and educational attainment
  - Changes in household consumption expenditures by location (urban and rural)
- Integrated Household Living Conditions Survey (EICV7)
  - Individual-level employment and demographic data, and, household-level consumption data
- Use microsimulation techniques to
  - Identify individuals likely to get the new jobs
  - Estimate their earnings
  - Estimate changes in the household income and consumption of households with the newly employed

JOB CREATION DUE TO ECE EXPANSION BY SEX, AGE, LOCATION, EDUCATION AND SCENARIO

	Scenario 1	Scenario 2	Scenario 3	Scenario 5
New employment	314,507	223,452	426,005	377,445
Share of new employment (percent)				
Women	54.2	51.4	57.8	55.4
Under 30	43.3	43.5	43.6	43
Rural	60.6	61	60.2	61.6
Less educated	81.5	81.8	82	81.1

CHANGE IN THE NUMBER OF CONSUMPTION-POOR INDIVIDUALS (DUE TO JOB CREATION BY SCENARIO (PERCENT OF THE BASELINE)

	Scenario 1		Scenario 2		Scenario 3		Scenario 5	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Baseline	100	100	100	100	100	100	100	100
Post policy	96.4	96.4	97.2	97.4	94.8	95	95.3	95.5
Addendum:								
Reduction in the number of poor ('000)	63.8	68.9	50.1	50.6	92.1	95.2	83.7	86.8

PRE- AND POST-POLICY RATES OF CONSUMPTION POVERTY AMONG JOB RECIPIENTS BY FAMILY TYPE AND SCENARIO (PERCENT)

	Scenario 1		Scenario 2		Scenario 3		Scenario 5	
	Pre-policy	Post-policy	Pre-policy	Post-policy	Pre-policy	Post-policy	Pre-policy	Post-policy
Married couple with children	26%	15%	28%	12%	28%	15%	26%	13%
Married couple no children	15%	10%	14%	10%	14%	9%	15%	8%
Female head with children	32%	13%	28%	10%	30%	13%	29%	12%

CONCLUSION

- Domestic borrowing is generally a better option for financing ECE expansion. Should be supplemented by concessional foreign financing.
- Better models require better data
- Macro:
  - Integrated Macroeconomic Accounts
  - Better central bank data
  - Better information on new payment methods
- Distributive:
  - Nationally representative time-use survey

Thank you!

For more information: zezza@unicas.it





ECE EXPANSION – SPECIFICATION OF TECHNOLOGY

- Identify the shares of various inputs, such as learning kits, food supplies, teacher services, etc., in the total running costs ("cost shares")
- Information from the government's strategic plan (ESSP) is used along with other sources
- Crucial missing information in the ESSP: pay of new teachers and support staff
- Important implicit assumption in the ESSP: new hires in ECDs will be unpaid volunteers, as in the current home and community-based ECDs
- We estimate the pay rates and assume that *everyone*, whether in schools or ECDs, is paid at the same respective rates