The Economywide Impacts and Risks of Malawi's Farm Input Subsidy Program

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Background and aim

- Agricultural growth is a key driver of national GDP growth (6–7%) and (one would expect) poverty reduction
- GAPP raises questions, but taken at face value the "official" outcomes are disappointing, especially considering the substantial investment the Farm Input Subsidy Program (FISP)
- Two objectives:
  - Add a piece to the growth-poverty puzzle and the role of FISP
  - Contribute to the FISP evaluation literature by conducting an economywide assessment that identifies all impact pathways and spillover effects

Farm Input Subsidy Program

- FISP implemented annually since 2005/06
  - Widely targeted: 50% of smallholders
  - Generous: fertilizer and seed inputs provided more than satisfies a households' annual maize demand; small voucher redemption fee
  - Costly: 3% of GDP; 70% of agricultural budget
- Initially great deal of support (globally), but skepticism has grown: implementation issues; fiscal sustainability; policy alternatives; weather and price risk
- Evidence: marginally positive to relatively high returns to the program in terms of national grain output and household income *of beneficiaries*; implications for rest of the economy less clear

Modeling approach

"Mixed-methods approach harnessing strengths of ex post evaluation data; triangulates this with information from other data sources; and addresses inherently ex ante design elements and risks in order to generate a comprehensive and unique method of program evaluation"

- CGE model base year 2003/04 (pre-FISP) includes the "traditional" maize sectors but also *negligibly small* "FISP maize", "FISP fertilizer", and "FISP seed" sectors → program design elements and farm-level evaluations used to carefully construct the FISP sectors
- Replicate 2006/07 program by exogenously transferring 500,000ha to "FISP maize" → once FISP operates at full scale, sector-specific technologies and program design elements exactly reflected
- Evaluate *direct production* effects, but also *indirect effects* associated with price and income transmission effects, resource allocation, financing, and balance of payments shifts
- Additional simulations consider marginal returns to fertilizer use; program scale; fertilizer price shocks; and weather variability

Simulation Design

Maize Technologies (per hectare)

	Traditional maize	FISP maize	
		Composites	Hybrids
Fertilizer (50kg bags)	**1.8**	**6.0**	**6.0**
Local seeds (kg)	12.1	0	0
Improved seeds (kg)	8.3	20.0	15.0
Hired labor (days)	44.3	56.8	60.8
Maize yield (tons/hectare)	**1.32**	**2.23**	**2.76**
From fertilizer use	0.44	1.49	1.78
Base yield for seed variety	0.79	0.75	0.97
Marginal return to fertilizer use (kg grain/kg N)		**15.0**	**18.0**

60% of FISP seed was hybrid in 2006/07 → average 16.8kg grain per kg of nitrogen

Results

Macroeconomic impacts

	Base value, 2003	Deviation from baseline	
		Donor funded	Tax funded
Maize production (1000mt)	**1,982.8**	**307.3**	**289.2**
Maize land (1000ha)	1,501.9	-236.8	-248.9
Maize yield (average mt/ha)	1.32	0.49	0.49
Crop diversification index	0.613	0.036	0.040
Real maize price index (%)	100	-4.26	-3.15
Real exchange rate index (%)	100	-2.74	0.72
GDP market prices (%)	**199.9**	**1.93**	**1.89**
Absorption	226.0	3.89	2.07
Exports	51.2	-0.87	4.64
Imports	77.3	5.82	3.81
FISP benefit-cost ratio (BCR)	**-**	**1.62**	**1.62**
Production-based BCR	-	0.99	0.92
Total cost (mil. USD)	-	65.9	67.2
Financed by foreign aid (%)	-	100.0	16.4

Results

Factor returns and poverty

	Base value, 2003	Deviation from baseline	
		Donor funded	Tax funded
Average land return (%)	**84.4**	**8.47**	**7.39**
Average farm wage (%)	86.1	7.02	4.42
Poverty headcount rate (%)	**52.4**	**-2.72**	**-1.78**
Rural	55.9	-2.69	-1.82
Urban	25.4	-2.90	-1.45

Results

Marginal return to fertilizer use and program efficiency

	Economywide BCR (production-based BCR)			
	Marginal return to fertilizer use (kg grain/ kg N)			
	11.8	13.4	16.8	18.5
FISP benefit-cost ratio	**0.78**	**1.06**	**1.62**	**1.90**
Production-based BCR	(0.49)	(0.63)	(0.92)	(1.06)

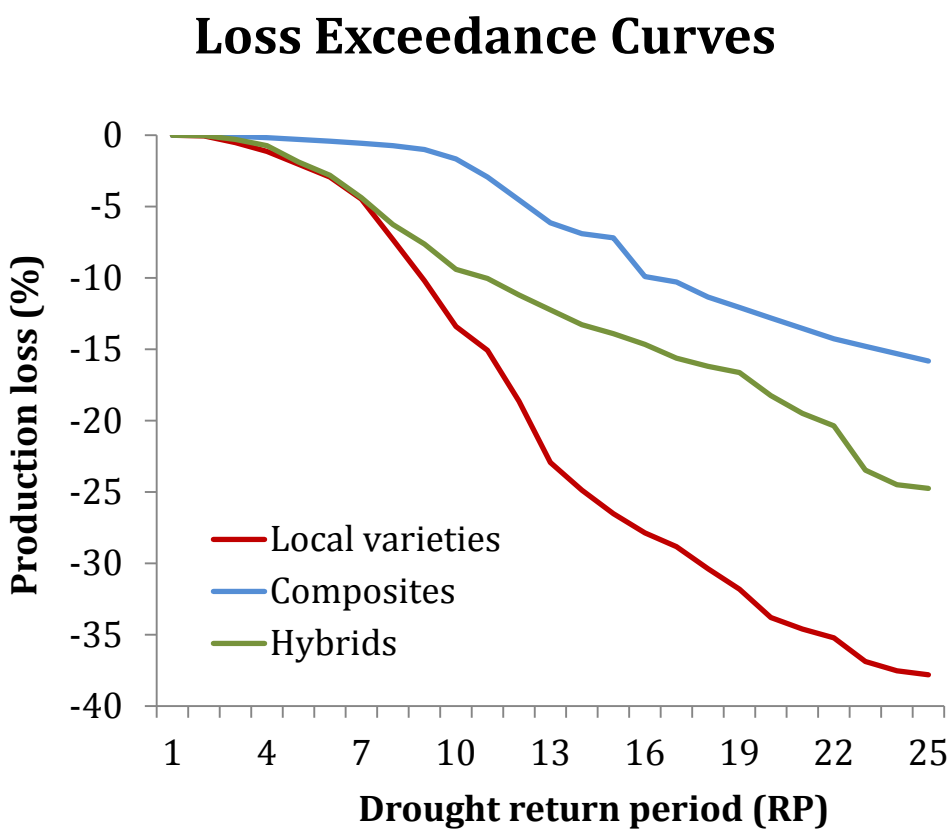
Results

Fertilizer price risks

Real world fertilizer prices	% change from baseline		
	+0%	+20%	+50%
FISP benefit-cost ratio	**1.62**	**1.41**	**1.22**
Production-based approach	0.92	0.49	0.07
Total costs (mil. USD)	67.2	82.3	105.3
Real exchange rate index	**0.72**	**1.12**	**1.67**
Tobacco production (1000t)	12.8	27.9	50.2
Poverty headcount	**-1.78**	**-1.37**	**-0.90**
Rural	-1.82	-1.42	-1.02
Urban	-1.45	-0.98	-0.01

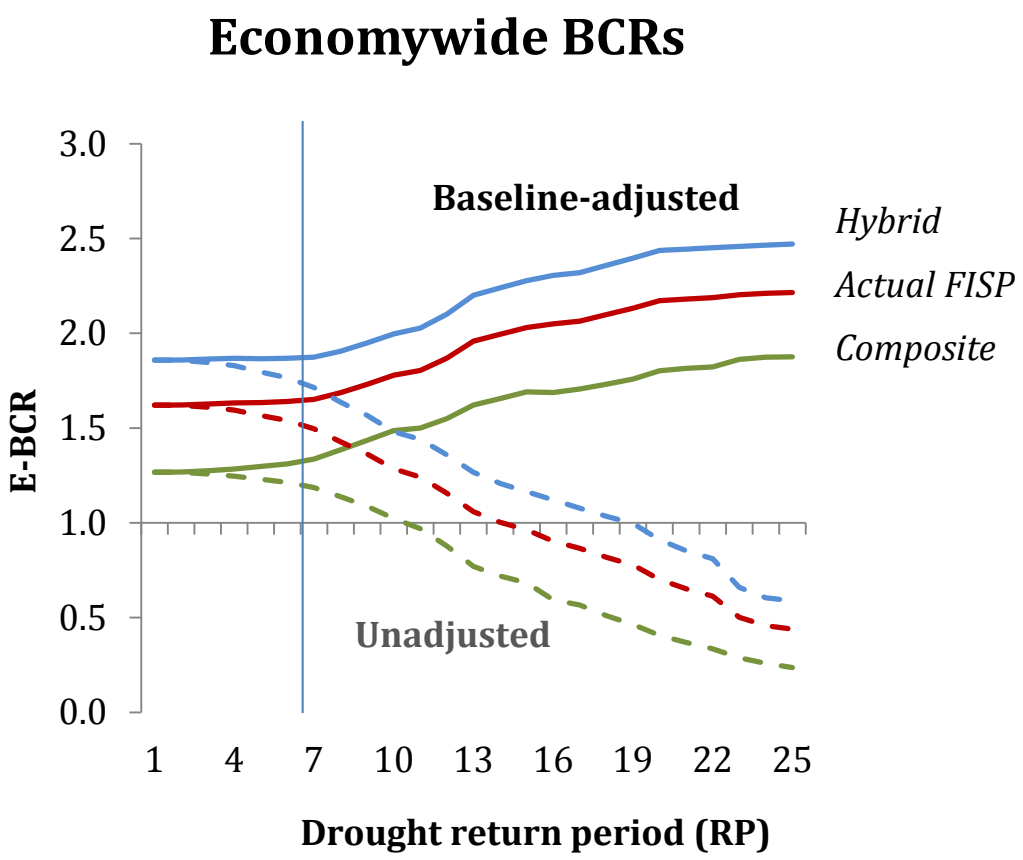
Simulation Design

Weather Variability



Results

Weather Risks



Conclusions

- FISP is reasonably pro-poor with potential to generate substantial indirect benefits
  - Indirect benefits are two-fifths of FISP's total benefits
  - Economywide approach complements survey-based methods
- BCRs depend strongly on marginal return to fertilizer use:
  - Drops below one with response rates from some survey studies
  - Crucial area of intervention; dealing with spending trade-offs
- BCRs fall when real fertilizer prices rise (or exchange rate depreciates); macroeconomic constraints come into play
- BCRs understandably fall during drought years; but FISP generates "double-dividends" of higher *and* more drought-resilient yields (hidden benefit)