Local Economy Wide Impact Evaluation Models (LEWIE): how to measure the local income multiplier of social cash transfers

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Food and Agriculture Organization,
the From Protection to Production Project, and
the Transfer Project

Social protection, entrepreneurship and labour market activation
Evidence for better policies

International Seminar and Policy Forum
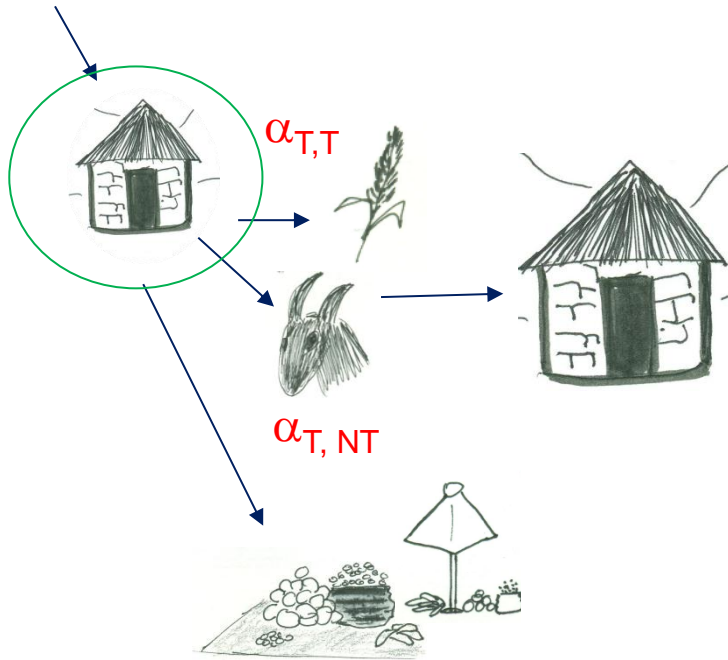IPEA Headquarters, Brasilia
September 10-11, 2014

The impact of a cash transfer on the local economy

- Transfer raises purchasing power of beneficiary households

- As cash spent, impacts spread to others inside and outside treated villages, setting in motion income multipliers

- Purchases outside village shift income effects to non-treated villages, potentially unleashing income multipliers there

- As program scaled up, transfers have direct and indirect (general equilibrium) effects throughout region
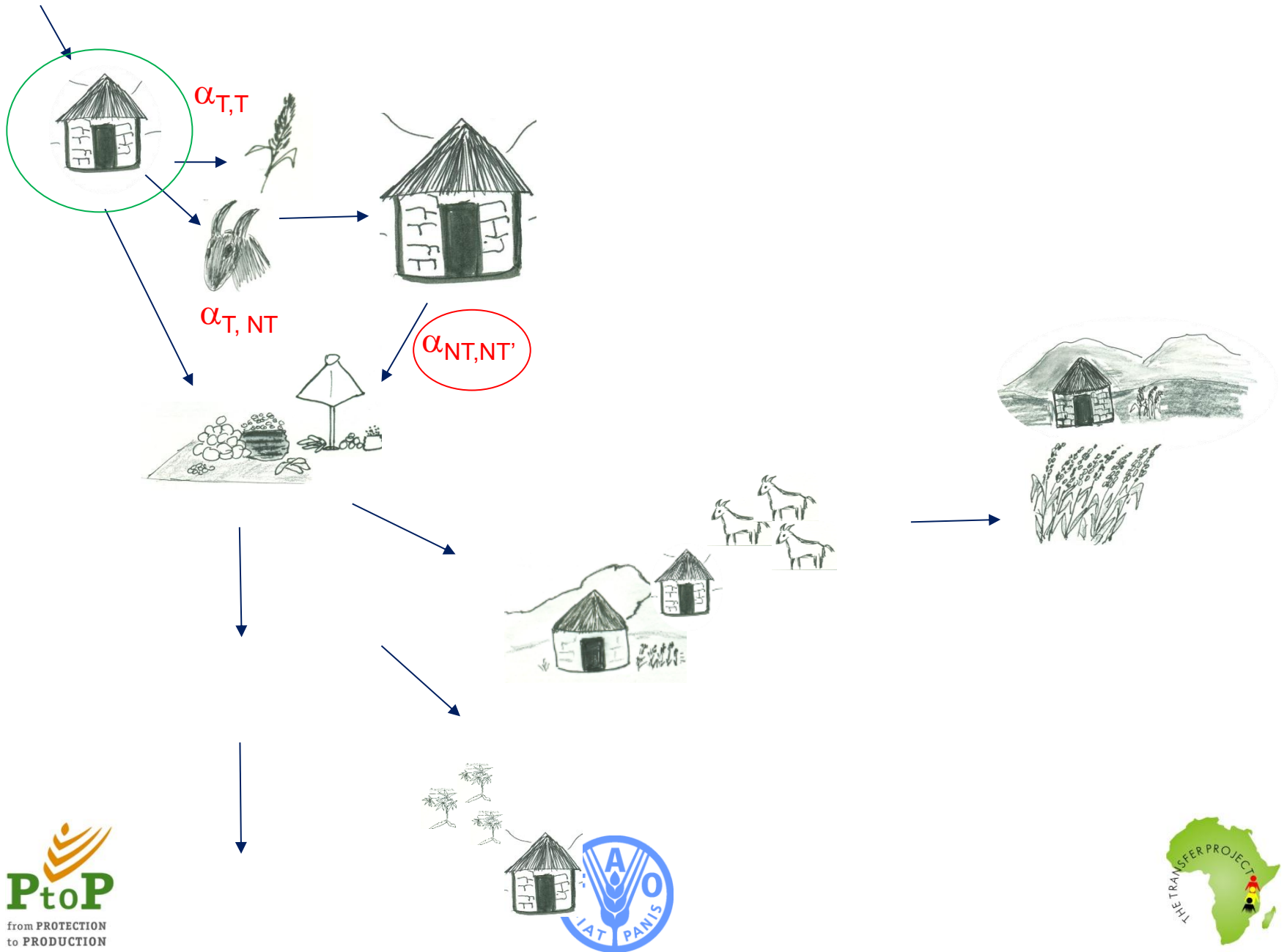
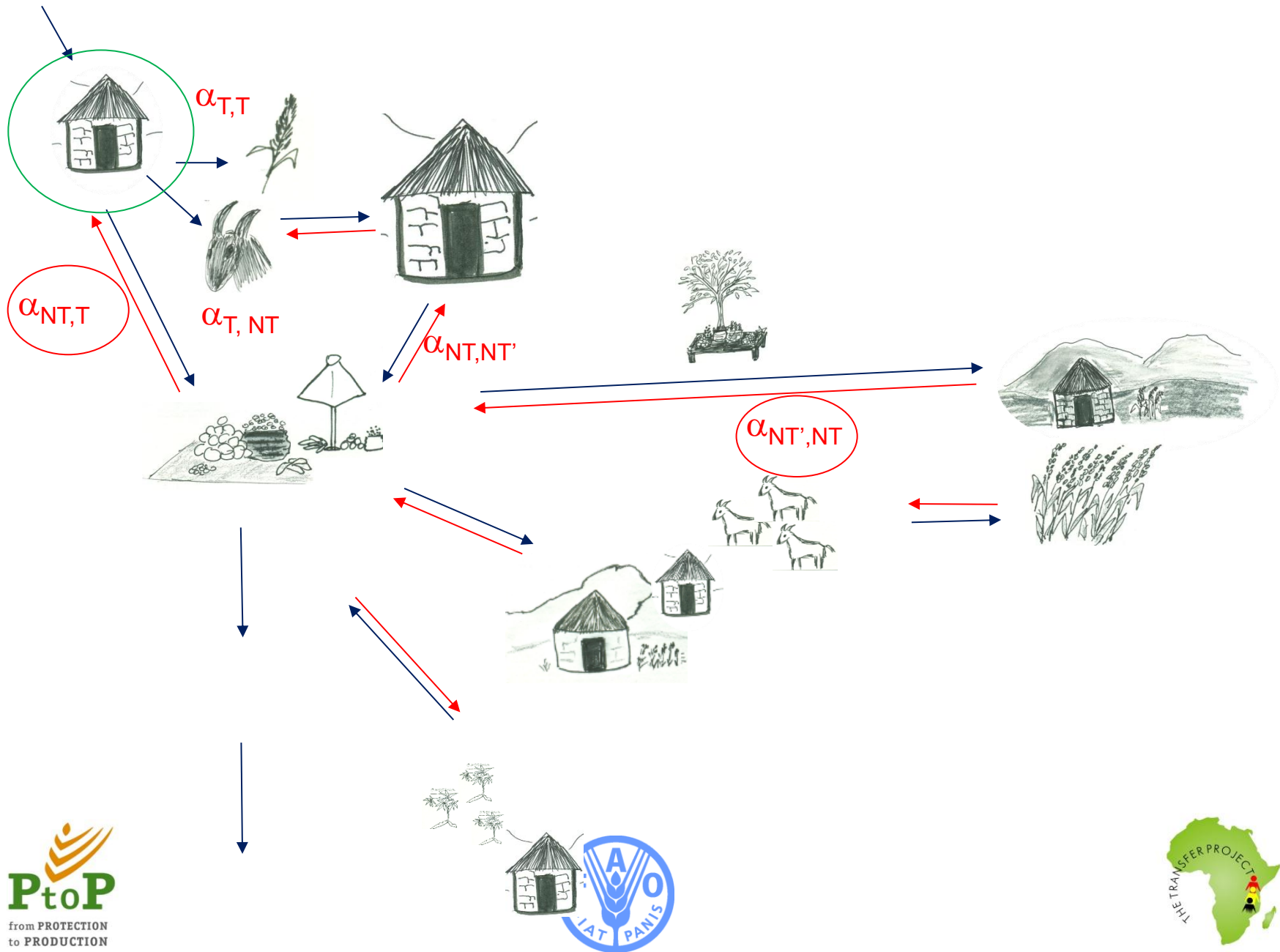# How do local economy effects work?

Transfer

$\alpha_{T,T}$

$\alpha_{T,\,NT}$

Transfer

$\alpha_{T,T}$

$\alpha_{T, NT}$

$\alpha_{NT,NT'}$

Transfer

$\alpha_{T,T}$

$\alpha_{NT,T}$

$\alpha_{T, NT}$

$\alpha_{NT,NT'}$

$\alpha_{NT',NT}$

Transfer

$\alpha_{T,T}$

$\alpha_{NT,T}$

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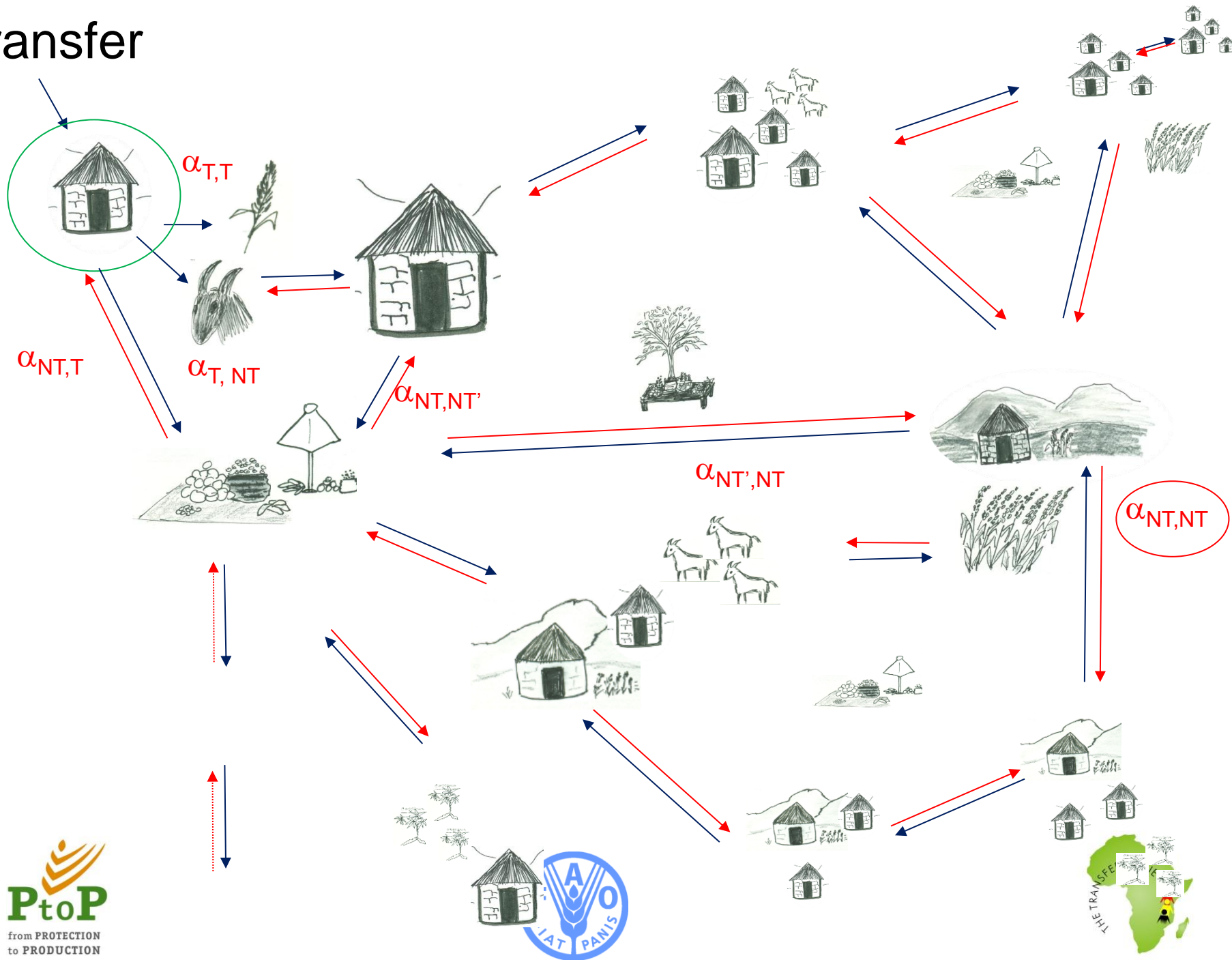
Three possible extreme outcomes

- Local supply expands to meet all this demand
  - Big local multiplier
- Everything comes from outside the local economy
  - No local multiplier at all: 1:1
- Local supply unable to expand to meet demand, and no imports
  - Inflation

Follow the money!

Survey data and the LEWIE model

Simulation of local economy impacts in the PtoP project

- Construct village Local Economy Wide Impact Evaluation (LEWIE) models for cash transfer program areas
  - Capture social and economic structure of village/local economy, including types of households
  - General equilibrium model: captures price effects
  - Simulate impact of cash transfer on local economy in terms of income multipliers
- Analytical work led by Ed Taylor and Karen Thome at UC Davis

Countries/evaluations included in this review

- Malawi
  - Mchinji pilot, 2008-2009
  - SCT Expansion, 2013-2015
- Kenya
  - CT OVC, 2007-2011
- Zambia
  - Child Grant, 2010-2014
- Ethiopia
  - Tigray SPP, 2012-2014
- Ghana
  - LEAP, 2010-2012
- Lesotho
  - CGP, 2011-2013
- Zimbabwe
  - HSCT, 2013-2014

Mixed method approach

- **Household and individual level impacts** via econometric methods (experimental and non experimental)
- **Perceptions** on household economy and decision making, social networks, local community dynamics and operations via qualitative methods
- **Local economy effects** via LEWIE (GE) modeling

LEWIE structure

- Centered on principal economic activities, household income sources and goods and services on which income is spent

  — Production activities (crop, livestock, services, other, retail) and corresponding commodities

  — Factors of production (hired labour, family labour, livestock, inventory, land, capital)

  — Degree of disaggregation depends on the context

    - By crop, gender of labour, etc

- In Kenya and Ethiopia, built two regional models, where local economies were considered structurally different

Constructing the LEWIE

- Household expenditure functions for each category
  - Estimate using household survey data
- Production functions and intermediate demand from agriculture and livestock
  - Estimate using household survey data
- Production functions and intermediate demand from other productive sectors
  - Estimate using business enterprise survey data

LEWIE data input matrix

- Initial values for variables of interest
  - Output of crop and other activities; demand for commodities and factors in each activity; consumption expenditures; public and private transfers, etc

- Economically estimated parameters and standard errors
  - Exponents and shift parameters in Cobb-Douglass production functions for each activity; marginal budget shares for consumption functions, etc.

- Complete matrix includes spatial organization of ZOI
  - Households consume and produce local commodities
  - Households export production or import goods from outside markets
  - Linkages between ZOI and rest of world
  - Essentially the Social Accounting Matrix (SAM)

Simulating the LEWIE

- LEWIE computer program in GAMS uses parameter estimates and baseline data to calibrate GE model of program-area economy

- Model consists of separate models of household groups (eligible and non eligible) calibrated and nested within a model of the treated economy

- Estimated SE for each parameter combined with Monte Carlo methods to perform significance tests and construct confidence intervals around income multipliers
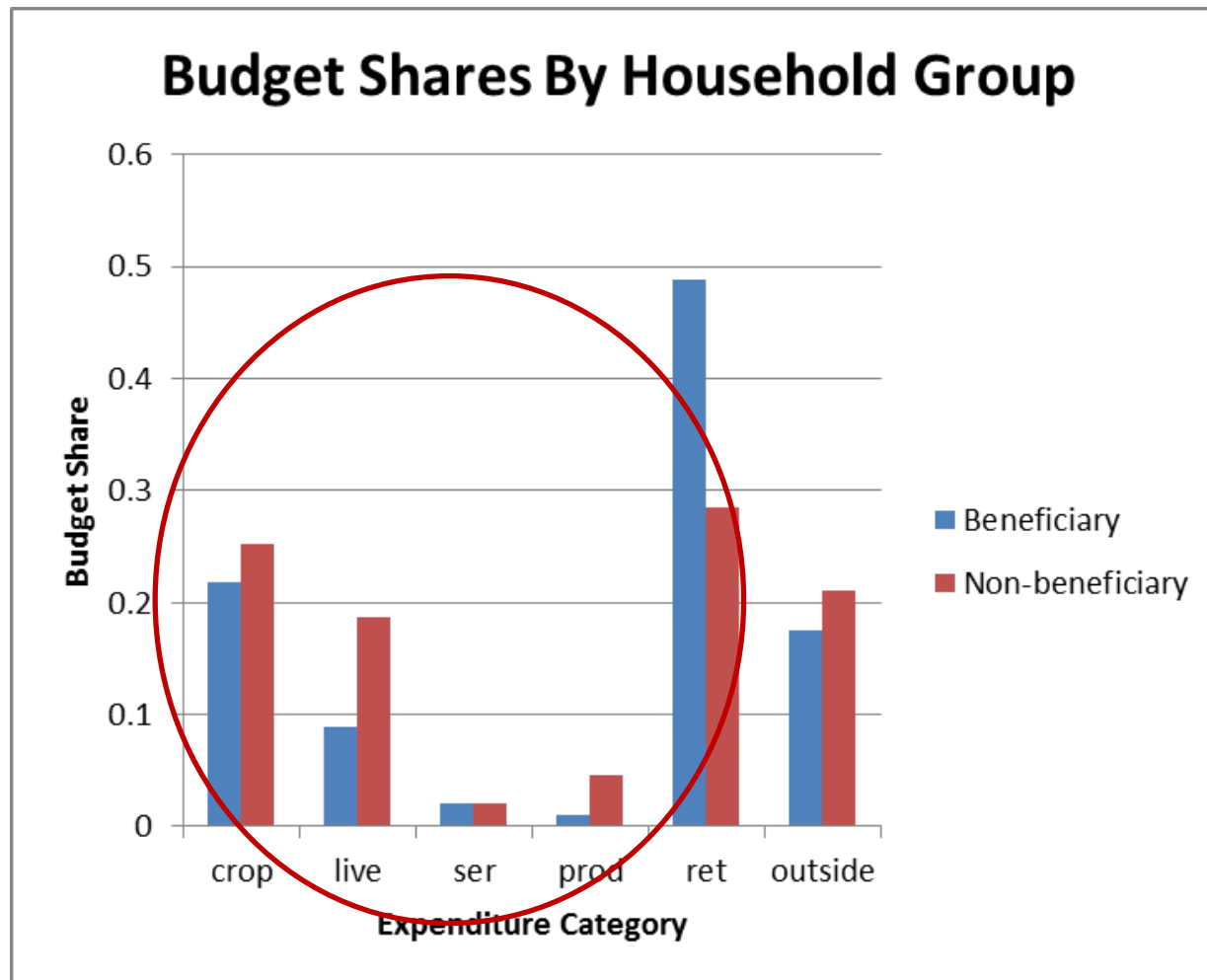
Market closure and other assumptions

- GE models require assumptions about where prices are determined
  - Some goods are tradable (prices set outside the local economy) while others are nontradable (prices set within)
    - Context of transaction costs
- These LEWIEs assume
  - Local markets for most production activities
  - Local markets for labor
  - High elasticity of labor supply
    - Reflects excess labor supply in rural Sub Saharan Africa
  - Assume land, capital and credit constraints
- Sensitivity analysis conducted on these assumptions
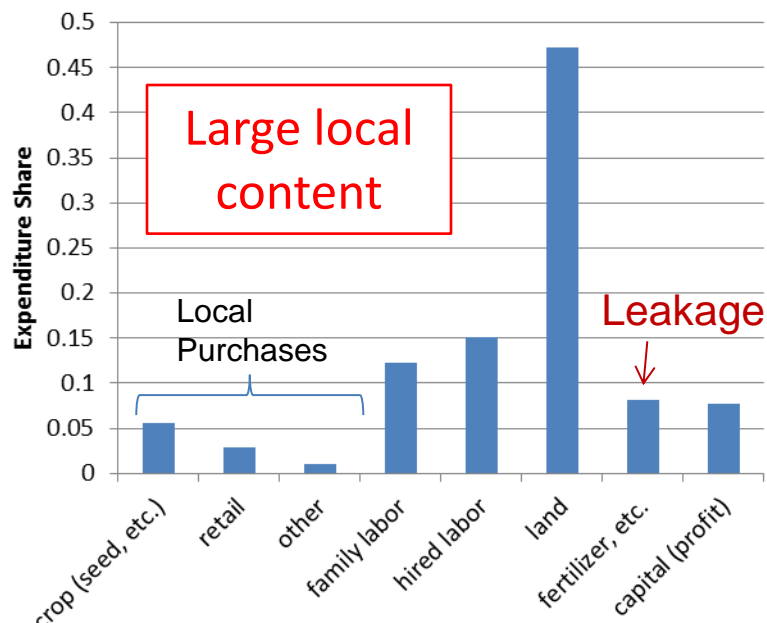 - Some more important then others

Some intuition

- Transfers increase demand for goods supplied inside and outside of local economy
- Impact of increased demand on production and local income multiplier depends on supply response to prices
    – More elastic supply response, the more positive spillovers
    – More inelastic, the more transfers will raise prices instead of stimulating production
- If production supply response is inelastic (constraints limit ability to raise output), then impact will be inflationary rather then real

Ghana: LEAP households spend about 80% of income inside the local economy
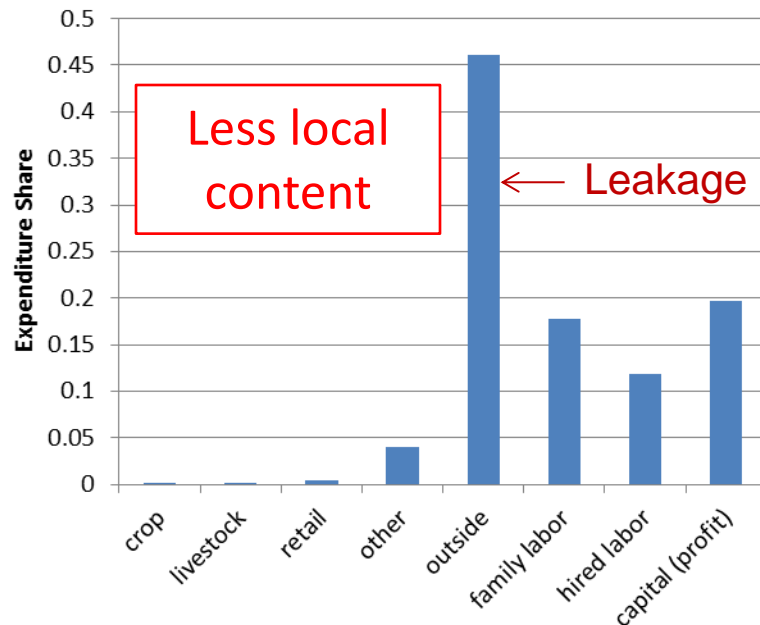

Budget Shares By Household Group

Budget Share (y-axis: 0 to 0.6)

Expenditure Category (x-axis: crop, live, ser, prod, ret, outside)

Legend:
- Beneficiary
- Non-beneficiary

These production activities buy inputs from each other, pay wages, and make profits

Crop Production Expenditures

Large local content

Local Purchases

Leakage

Payments to factors

Retail Activity Expenditures

Less local content

← Leakage

Payments to factors

Data from Ghana

These expenditures start a new round of income increases

Simulated income multiplier
of the Ghana LEAP programme

	Base model
Income multiplier	
Nominal	2.50
(CI)	(2.38 – 2.65)
Real	1.50
(CI)	(1.40 – 1.59)

MAX

Every 1 Cedi transferred can generate 2.50 Cedi of income
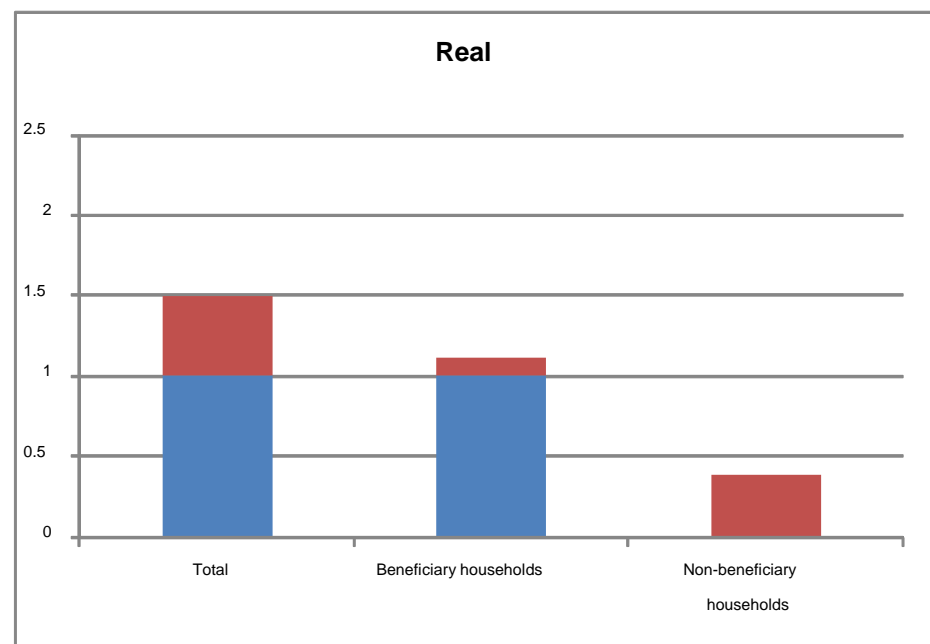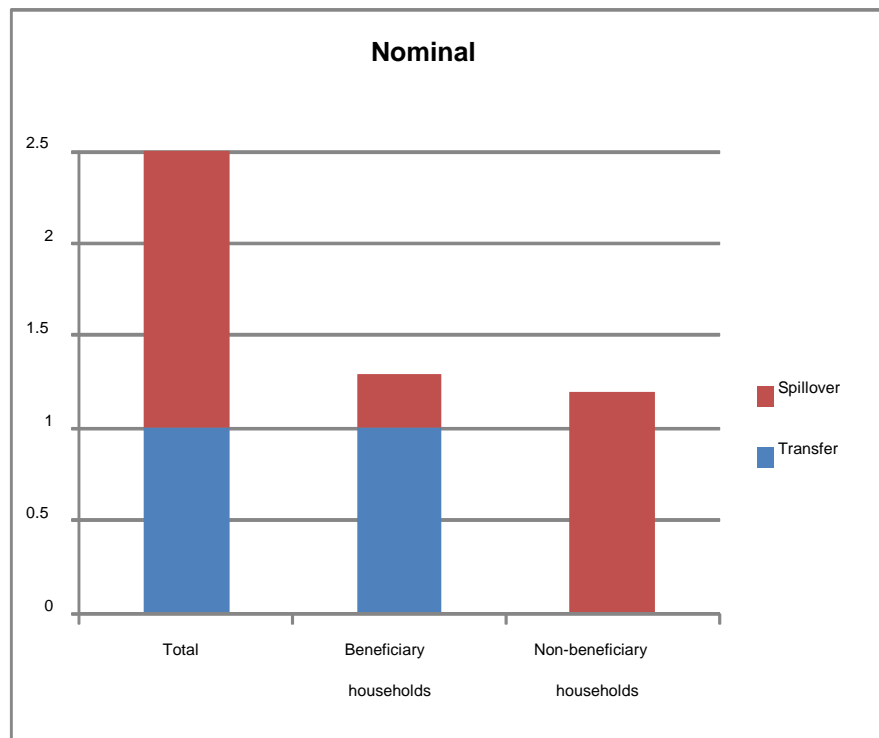
Production constraints can limit local supply response, which may lead to higher prices and a lower multiplier

When constraints are binding, every 1 Cedi transferred can generate 1.50 Cedi of income

MIN

Nearly all the spillover goes to non-beneficiary households

¾ of increase in value of production goes to non beneficiary households

Production multiplier for:	Beneficiary	Non beneficiary
Crop	0.05	0.22
Livestock	0.02	0.15
Retail	0.24	0.54
Services	0.02	0.08
Other Production	0.01	0.04
TOTAL	**0.34**	**1.03**

For every 1 Cedi transferred to beneficiary households, the value of production earned by non beneficiary households increases 1.03 Cedi
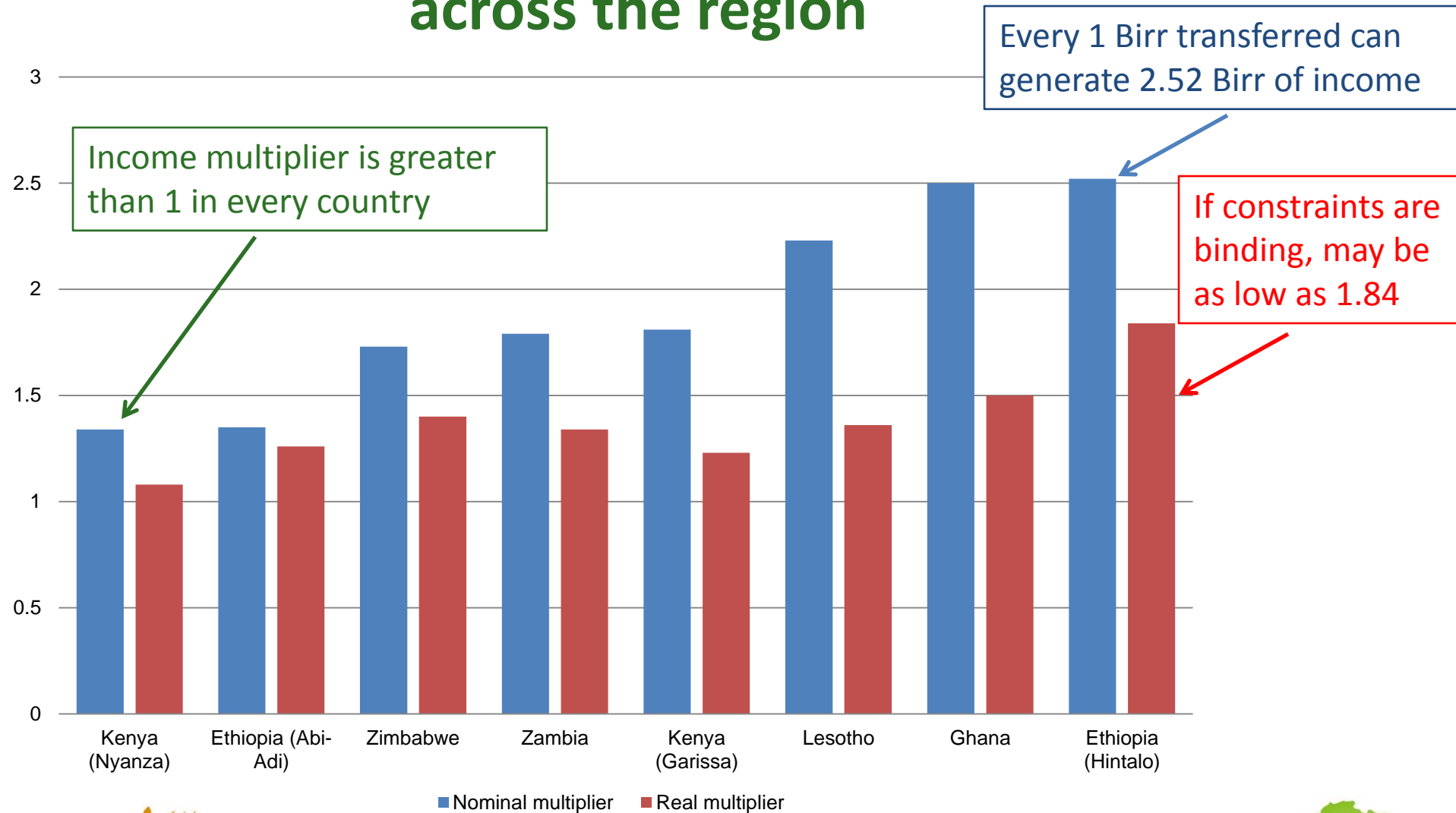
Alternative market structure scenarios (Lesotho)

	Base	Alternative 1	Alternative 2
Elasticity of labor supply	High	Low	Low
Liquidity constraint on purchased inputs	Off	off	on
Total Income multipliers			
Real	1.36	1.14	1.02
(CI)	(1.25- 1.45)	(1.08- 1.20)	(0.94- 1.09)

Keeping constraints on land and capital;
Assumptions on market structure come from qualitative fieldwork and expert opinion

Cash transfers lead to income multipliers across the region

Every 1 Birr transferred can generate 2.52 Birr of income

Income multiplier is greater than 1 in every country

If constraints are binding, may be as low as 1.84

■ Nominal multiplier ■ Real multiplier

PtoP from PROTECTION to PRODUCTION

Size of income multiplier varies by country and context—Why?

- Which sectors get stimulated
  - Where do households and activities spend their income?*

- Openness of economy
  - How much demand is for goods produced inside the economy?
  - What goods are tradable, where are prices determined?
    - Retail: biggest sector, and most open
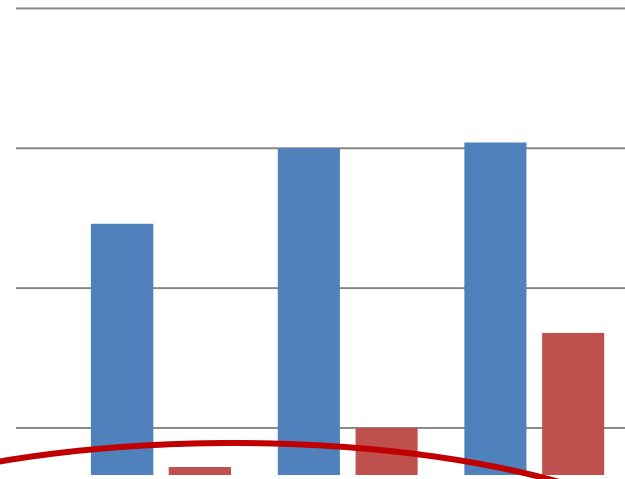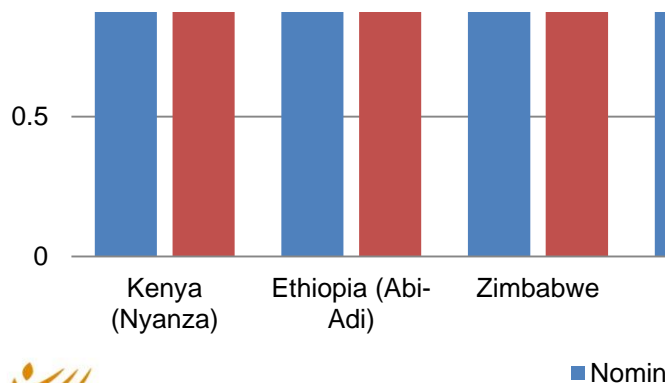
- Supply response
  - Intensity of local production in different inputs (labor, etc.)*
  - Elasticities of these inputs' supplies
- Other constraints
  - Cash constraints on inputs
  - SCT loosens these for beneficiaries, but not for non-beneficiaries

0.5

0

Kenya (Nyanza)   Ethiopia (Abi-Adi)   Zimbabwe

■ Nomin

LEWIE data requirements: household survey

- Detail on family businesses
  - Agricultural and non agricultural enterprises
  - Production, input use—enough to estimate a production function
- Detail on labour supply
- To/from whom and where on all interactions in which cash or goods are exchanged
  - Business sales and consumer and input purchases
  - Asset values
  - Transfers
    - Public and private, incoming and outgoing
  - Labor
  - Credit and savings

Practical problems with the household survey data

- Not all impact evaluations collected data on non eligibles

- Required use of secondary data (LSMS) to estimate parameters for non eligibles

- Cash transaction data not always available in secondary data
  - Had to borrow from another country in one instance

- Complicates gauging scale of program

LEWIE data requirements: Business enterprise survey

- Non agricultural business only
  - Agricultural activities adequately captured in household survey
  - Enough information to estimate a production function

Important decisions in planning business enterprise survey

- Determine boundaries of zone of influence (ZOI)
  - Village or cluster of villages?
  - Dealing with businesses on the periphery, rotating markets, itinerant traders
  - Trade off:
    - Wider you search, greater the multiplier, but weaker the linkage
- Capturing unique or large businesses

Complementary sources of information

- Groundtruthing assumptions
  - Expert opinion
    - Agricultural experts, local informants
  - Qualitative fieldwork
  - Price information from surveys (household and community)

FAQ

- Does the size of the transfer affect the income multiplier?
  - Yes, model is nonlinear….
  - Yes, change spending patterns……
  - No, size of transfer unlikely to be large enough
- Does the share of households receiving the transfer affect the income multiplier
  - No…….unless the expanding share brings in different kinds of households

Some conclusions

- From a political economy perspective, great demand and anticipation for LEWIE results
  - Context of weak political support, fears of dependency, view of cash transfers as charity with no economic content
- Clearly demonstrate the potential impact of cash on the local economy
  - Putting a number on it
- LEWIE most powerful as a comparative tool

Our websites

From Protection to Production Project

http://www.fao.org/economic/PtoP/en/

The Transfer Project

http://www.cpc.unc.edu/projects/transfer