

FOOD SECURITY AND PUBLIC EXPENDITURE IN BOLIVIA:

PUTTING MONEY WHERE YOUR MOUTH IS?



Jose Cuesta (PRMPR)
Svetlana Edmeades (LCSAR)
Lucia Madrigal (PRMPR)

World Bank
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Mexico



Food security and agricultural spending

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Question on **allocation**

To what extent agricultural spending is needs-based with respect to food insecurity? OR
Are public resources going where they should?

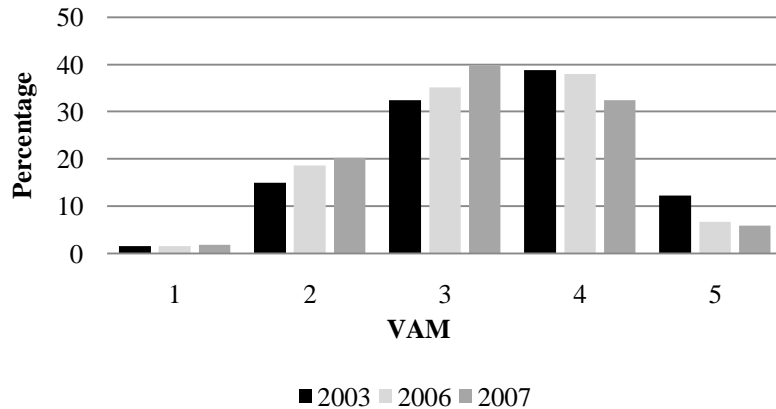
Question on **effectiveness**

Is it effective in reducing vulnerability to food insecurity?

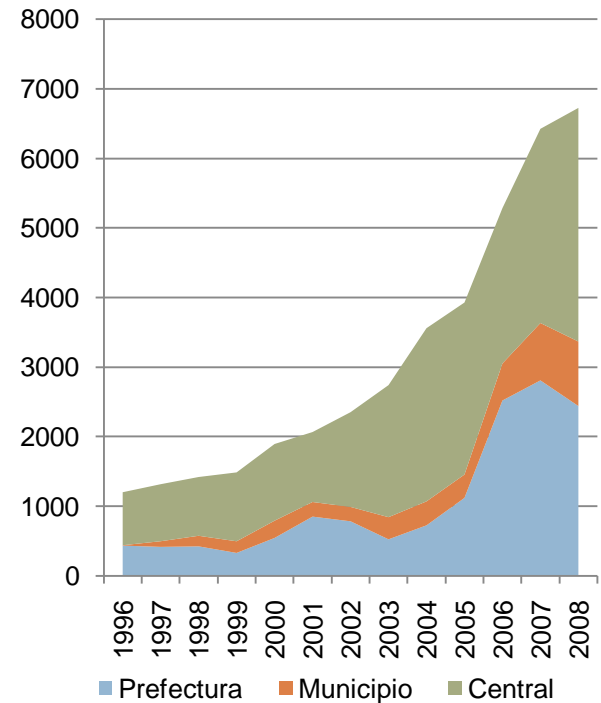
A simple story of success

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Figure 2. Percentage of Municipalities by Vulnerability Status



Agricultural spending by administrative level



Food Security Definition in Bolivia

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- Based on “access to nutritious food” definition, that is:
 - “all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs, and food preferences for an active and healthy life”

- Bolivia follows this international definition around four dimensions:
 - ▣ Food availability
 - ▣ Access to food
 - ▣ Stable access to food
 - ▣ Safe use of food

- Definition of Vulnerability to Food also follows WFP’s VAM approach:
 - ▣ Risk exposure (e.g. natural disaster)
 - ▣ Capacity to address food insecurity (e.g., incomes, access to basic services)
 - ▣ Current situation as part of a historical trend (e.g. past malnutrition and poverty)

Food security interventions in Bolivia

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- About 13 agricultural programs have been identified as related to food security
 - land redistribution;
 - promotion of food production and exports by state-owned enterprises
 - food security programs, including support to communities & small producers
 - nutritional programs (children, women) and school meals, among others.
 - extension of the production frontier

Source: INE monitoring plan

... from definition to measurement

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- Dependency rate
- Life expectancy
- Agricultural potential
(4 values on soil capacity)
- Forestry potential (5 values)
- Road density
- Draught frequency
- Frost days per year
- Low weight at birth
- Per capita household food expenditures
- Urbanization rate
- Rural population density
(and sq)
- Prop. Institutionally attended births
- Schooling years
- Log of per capita consumption
- Under five malnutrition rate
- Altitude
- Rainfall
- Flood Propensity
(categorical 4 values)

... from measurement to analysis ...

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- ❖ VAM (Municipal Vulnerability Index)
- ❖ 1=very low, 2=low, 3=moderate, 4=high, 5=very high vulnerability
- ❖ For 2003 each municipality is assigned a value 1 to 5 according to “agreed” vulnerability based on background study on vulnerability of 15 agro-ecological regions in the country (socioeconomic, demographic, ethnic and gender equity, climatic risks, subjective ability to respond to risks)
- ❖ MNL of VAM2003 on 20 variables
- ❖ MNL estimates allow 5 probabilities for $VAM_i=1\dots 5$ for each municipality
- ❖ Estimated MNL on 10 variables for 2006 and 2007 (only those statistically significant in 2003)
- ❖ Largest estimated $\text{prob}(VAM=i)$ determines assigned VAM to each

Some analytical caveats

8

A few obvious

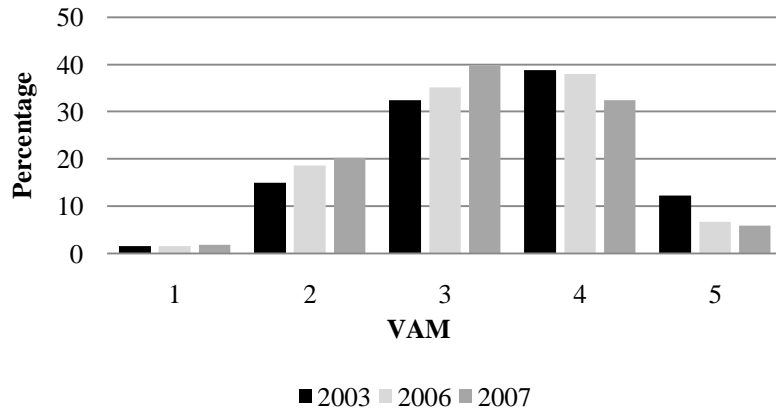
- ❖ Original VAM 2003
- ❖ Pragmatic selection of variables based on data considerations (availability and frequency)... too far?
- ❖ Interdependence:
 - ❖ Rural pop density and urbanization
 - ❖ Low birth weight and institutional delivery
 - ❖ Floods, rainfall, draught

Not so obvious

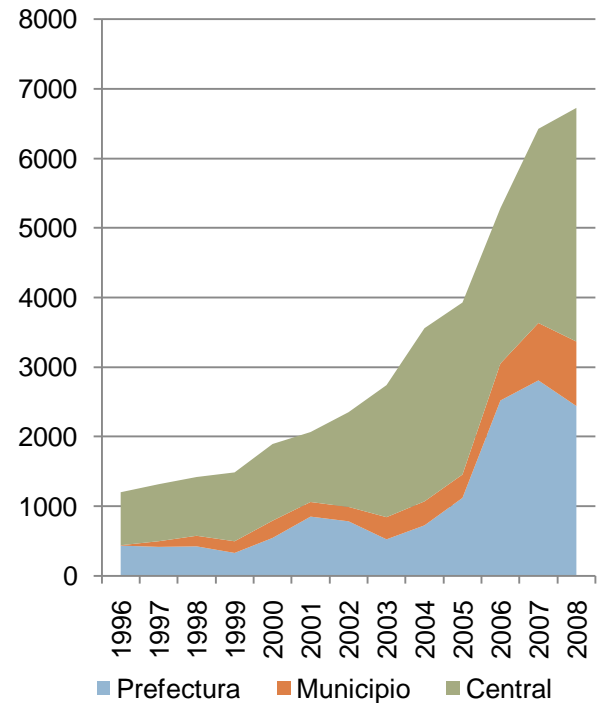
- ❖ Inputs for and outcomes of FS (e.g., malnutrition, urbanization)
- ❖ Assumed same structural model between 2003 and 2007 (despite policies)
- ❖ Little wiggle room for IV

A simple story of success... really?

Figure 2. Percentage of Municipalities by Vulnerability Status

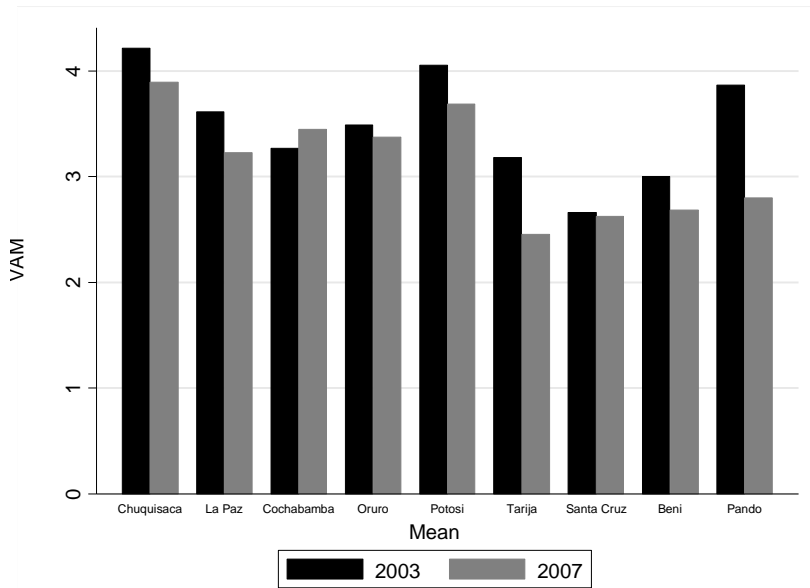


Agricultural spending by administrative level

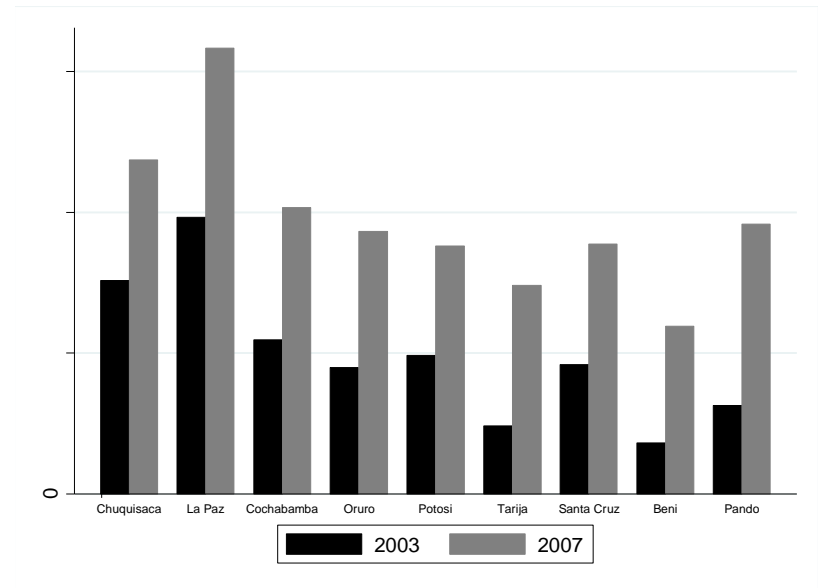


Simple perhaps, but not uniform ...

Figure 1. Vulnerability Status by Department



Per Capita Agricultural Spending by Department (constant 2005 prices)



... and not so simple

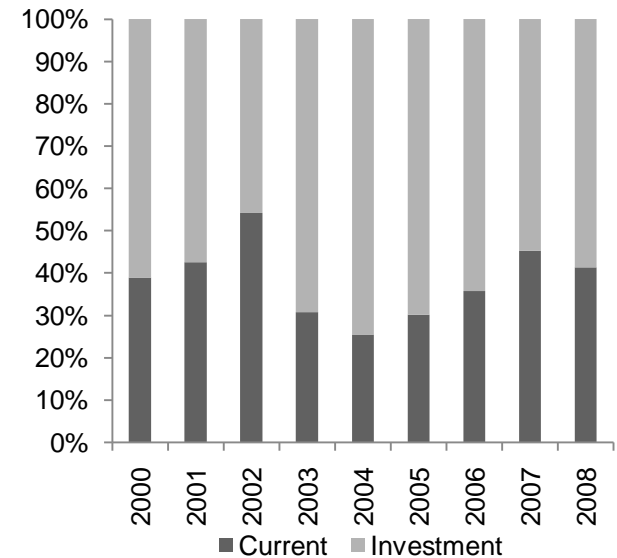
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Table 1. Vulnerability Transition Matrix by Municipality

		2006		2007	
		Low vulnerability	High vulnerability	Low vulnerability	High vulnerability
2003	Low vulnerability	146 (45%)	14 (4%)	148 (45%)	12 (4%)
	High vulnerability	35 (11%)	132 (40%)	54 (17%)	113 (35%)

- ❖ Btw 15-20% of municipalities changed status
- ❖ For 1 that worsens, 3 improve

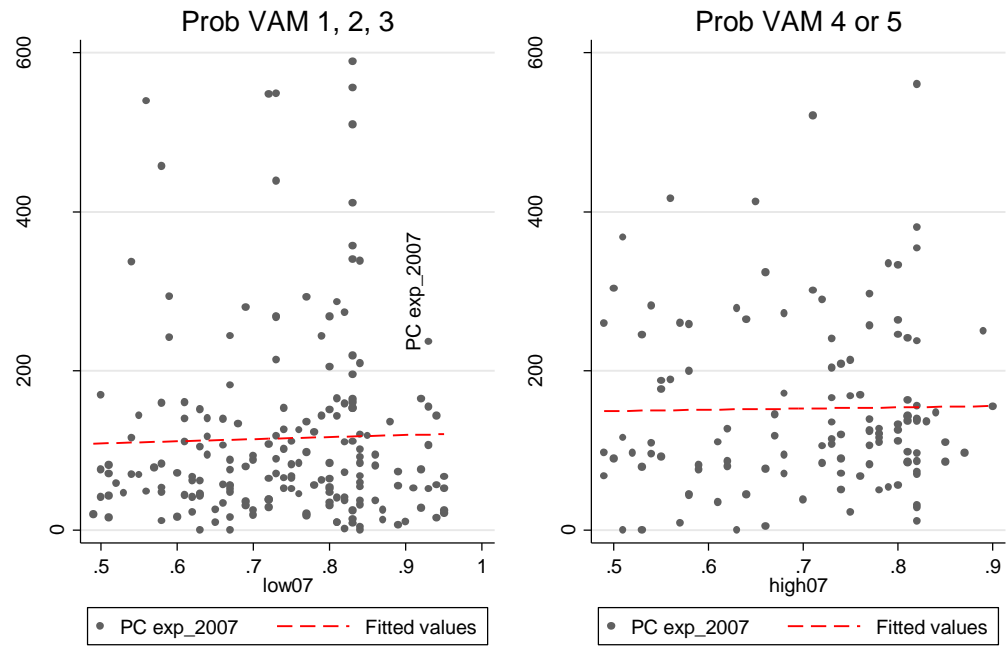
Distribution of Agricultural Spending



- ❖ Substantive annual variations in investments

In fact, low correlation ag. sp. and VAM

Total PC AGR Expenditure and Prob of being in each VAM cat



Empirical strategy

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Probit of VAM ($_{high, low}$) on pc capita ag. spending

PROBABILITY (VAM_i = high)=

f(Ag spending, Ag-related spending, Regions)_i

- ❖ Several categories of spending considered
- ❖ Regional dummies and region-clustered errors
- ❖ Also municipal capacity, political and social spending variables

Agricultural Spending Categories

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Expenditure Data Disaggregated by:

Level of Government

- Central
- Departments (9)
- Municipalities (327)

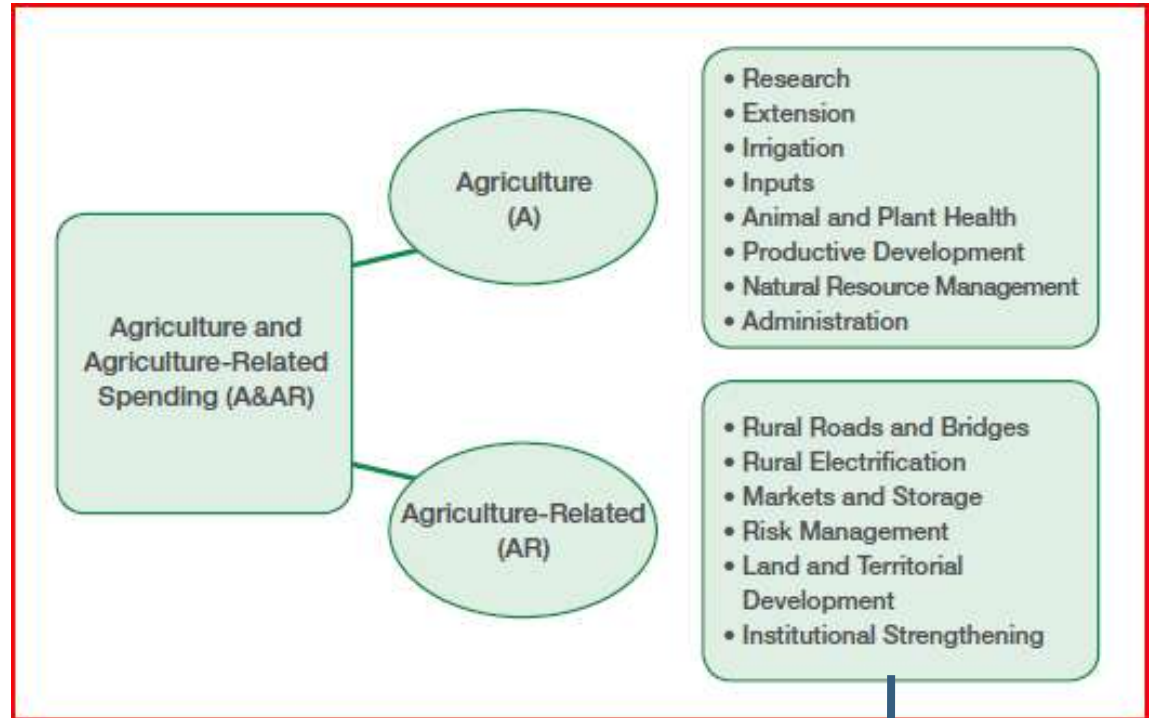
Function

Economic classification

- Current
- Capital

Period of 13 years

- 1996 to 2008



Research & Extension
Support & Development
Infrastructure
Administration &
Procedures

Singling out the level of spending from increases in spending

15

❖ **Contemporaneous**

PROBABILITY (VAM = high) in 2007=

2007 $f(\text{Ag spending, Ag-related spending, Regions})$ in

❖ **Lagged levels**

PROBABILITY (VAM = high) in 2007=

2003 $f(\text{Ag spending, Ag-related spending, Regions})$ in

❖ **Lagged and Incremental effects**

PROBABILITY (VAM = high) in 2007=

f(Spending 2003 Change Spending 2003-07, Regions)

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Findings

- ❖ Positive impact of ag sp on high vam
- ❖ Agriculture and ag. related spending significant
- ❖ Investment drives results
- ❖ Infrastructure significant, also Research & Extension
- ❖ Region specific effects
- ❖ Incremental spending is significant and negative but negligible in magnitude

Effects of Initial and Incremental Per Capita Spending on Vulnerability					
VARIABLES	(1)	(2)	(3)	(4)	(5)
	Total exp	Total exp (quadratic form for change)	Restricted and extended definitions	Current and investment categories	By function
Total expenditure 2003	0.9950***	0.9659***			
	(0.344)	(0.338)			
Restricted expenditure 2003			0.9361*		
			(0.533)		
Extended expenditure 2003			1.0241**		
			(0.465)		
Current expenditures 2003				0.0598	
				(0.562)	
Investment expenditures 2003				1.2893***	
				(0.494)	
Research and extension 2003					-10.5311*
					(6.056)
Infrastructure 2003					1.3837**
					(0.544)
Support and development 2003					1.7249
					(1.746)
Administration and procedures 2003					-0.8587
					(1.351)
Change in per capita agricultural spending 06-07 ("incremental" effect)	-0.0001**	0.0001	-0.0001**	-0.0001*	-0.0001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Change squared in per capita agricultural spending 06-07 ("incremental" effect)		-0.0000			
		(0.000)			
Chuquisaca	0.3492***	0.3479***	0.3507***	0.3411***	0.3322***
	(0.117)	(0.118)	(0.114)	(0.119)	(0.122)
Cochabamba	0.1234	0.1135	0.1235	0.1231	0.1304
	(0.095)	(0.094)	(0.095)	(0.095)	(0.096)
Oruro	0.1238	0.1136	0.1245	0.1383	0.1262
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Potosí	0.3438***	0.3485***	0.3444***	0.3485***	0.3385***
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	(0.090)	(0.078)	(0.090)	(0.094)	(0.094)
Santa Cruz	-0.2895***	-0.2823***	-0.2892***	-0.2874***	-0.2803***
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	(0.095)	(0.094)	(0.095)	(0.095)	(0.096)
Oruro	0.1238	0.1136	0.1245	0.1383	0.1262
	(0.104)	(0.103)	(0.104)	(0.104)	(0.104)
Potosí	0.3438***	0.3485***	0.3444***	0.3485***	0.3385***
	(0.097)	(0.099)	(0.097)	(0.096)	(0.097)
Tarija	-0.2784***	-0.2794***	-0.2779***	-0.2739***	-0.2799***
	(0.090)	(0.078)	(0.090)	(0.094)	(0.094)
Santa Cruz	-0.2895***	-0.2823***	-0.2892***	-0.2874***	-0.2803***
	(0.062)	(0.061)	(0.063)	(0.063)	(0.064)

Key results

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	CONTEMPORANEOUS (VAM 2007)	LAGGED (VAM 2007)	LAGGED & INCR (VAM 2007)
Effect of contemporaneous agricultural spending , TOTAL	+ More pc ag spending, higher vulnerability		
Effect of lagged agricultural spending , TOTAL		+ More pc ag spending, higher vulnerability	+ More pc ag spending, higher vulnerability
Effect of incremental agricultural spending, ALL			- More pc ag spending between 2003 and 2007, less vulnerability but negligible
Current / Investment	Higher inv, higher vulnerability	Higher inv, higher vulnerability	Higher inv, higher vulnerability
Infrastructure / R&E	More pc infr and more R&E, higher vulnerability	More pc infr and less R&E, lower vulnerability	More pc infr and less R&E, lower vulnerability
Regional Effects	Yes (CHU, POT +) (TAR, BEN, PAN, STC --)	Yes (CHU, POT +) (TAR, BEN, PAN, STC --)	Yes (CHU, POT +) (TAR, BEN, PAN, STC --)

A few additional considerations

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- **Controls typically not significant:**
 - ▣ Civil servants pc, party in office, pc social spending
- **But:**
 - ▣ % executed over approved budget and
 - ▣ % of investments from own resources significant and negative: **more capacity, lower vulnerability**
- Robust regional dummies effects
- Other specifications do not change key messages (no pc, VAM5, improv/deteriorations)

Key Messages

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- Decreasing Vulnerability between 2003 and 2007
 - ... but improvements have not been uniform

- About 1 out of 5 municipalities changed VAM status
 - ... for each municipality worsening, 3 improved
 - ... but no region has gone from VH/H to M/L

Key Messages

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- Two facts are clear:
 - large increases in agricultural spending and
 - lower vulnerability to food insecurity in Bolivia

- The link between the two facts is not so clear:
 - In terms of levels of spending, **evidence that agricultural spending goes where is most needed**
 - A larger effect is observed when we allow for time to elapse
 - In terms of changes in spending, **evidence of some effectiveness in reducing high vulnerability**
 - The magnitude of the effect is very small
 - In terms of location of spending, **evidence of regional patterns of effects for municipal vulnerability**

Final Thoughts

- The results are in line with previous evidence of decentralization leading to increased spending and to investments where needed most, but with only –at best– partial success (Faguet, Inchauste).
- Food security is a complex issue – interventions in one sector are necessary, but not sufficient for its achievement; not easy to pick up effects
- Some next steps ...
 - ▣ Further refinement of Food Security categories (considering a more cross-sectoral approach)
 - ▣ Separate effects of Risk Vs. Capacity parts of VAM
 - ▣ Proper account of (desirable) endogeneity ?

Gracias!

29



Findings

- ❖ Civil servants per capita not significant
- ❖ % of budget executed over approved or % own resources invested significant but negligible
- ❖ Political party in office (different from central government) not significant
- ❖ Per capita social spending not significant

Table A3. Effects of Per Capita Agricultural Spending with Observed Controls, 2007

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total expenditure	0.5399**	0.5776***	0.6113*	0.3190*	0.5842***	0.5839*		
	(0.217)	(0.221)	(0.328)	(0.178)	(0.221)	(0.325)		
Restricted expenditure							1.7848**	
							(0.778)	
Extended expenditure							-0.0856	
							(0.522)	
Current expenditure								0.8600
								(0.964)
Investment expenditure								0.5380
								(0.408)
Civil servants pc, 2006	2.0963					0.1927	-0.8149	0.6524
	(11.532)					(23.856)	(22.781)	(23.946)
Political party in office, 2006		0.0683				0.0782	0.0937	0.0792
		(0.063)				(0.078)	(0.080)	(0.078)
% budget executed over approved (2006)			-0.0003*			-0.0003*	-0.0003*	-0.0003*
			(0.000)			(0.000)	(0.000)	(0.000)
% of investment financed by own resources (2006)				-0.0000***				
				(0.000)				
Per capita social spending, 2006					-0.0000	-0.0001	-0.0001	-0.0002
					(0.000)	(0.000)	(0.000)	(0.000)
Regional dummies	yes	yes	yes	Yes	yes	yes	yes	yes
Population	yes	yes	yes	Yes	yes	yes	yes	yes
Observations	300	327	234	314	327	227	227	227
R2	0.214	0.22	0.237	0.27	0.217	0.225	0.235	0.225

*** p<0.01, ** p<0.05, * p<0.1

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				(0.000)				
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					(0.000)	(0.000)	(0.000)	(0.000)
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