



# Gravity, Democracy, Political Affinity and Food Aid: Do Categories and Delivery Modes Matter?

Francis Langlois

Bruno Larue

Érick Duchesne

Canadian Agricultural Trade Policy Research Network

2010 workshop, Toronto, May 15, 2010



**CRÉA**

CENTRE DE RECHERCHE EN  
ÉCONOMIE AGROALIMENTAIRE



# OVERVIEW OF THE PRESENTATION

- General Context
- Scientific Context
- Food Aid Definition
- Theoretical Framework
- Empirical Models
- Results
- Food Aid by Categories
- Food Aid by Delivery Modes
- Conclusion



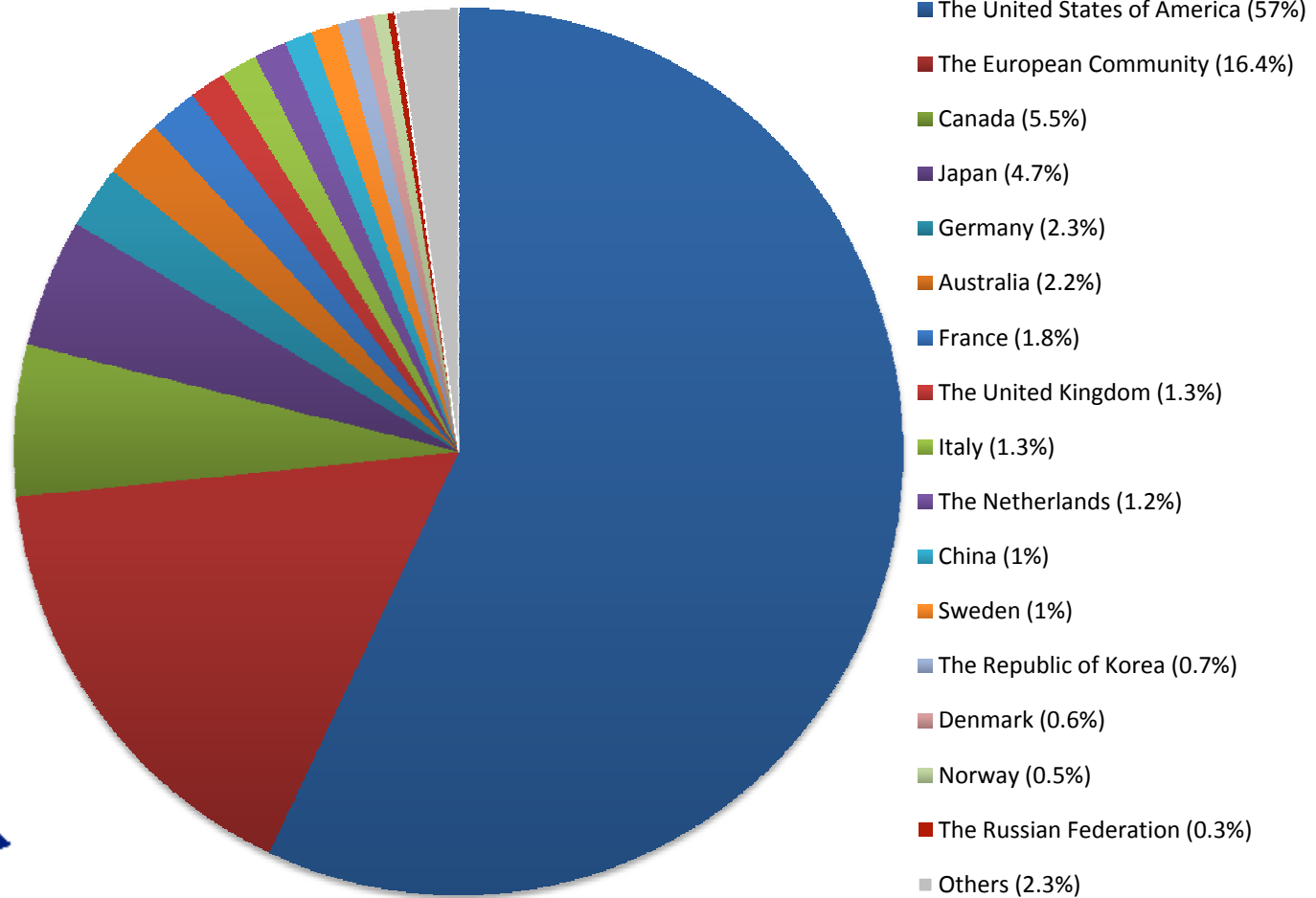


## General Context

- The average price of staple food commodities increased by 48 percent, in real terms, from 2006 to 2008 (FAO)
- Food Aid Convention
- Previous Studies
- Research Question
  - *What are the factors conditioning the volume of food aid sent to potential recipient countries?*



# Distribution of Food Aid Flow by Donor



## Scientific Context

- Most studies consider the distribution pattern for a single donor to various recipient countries
  - Mainly the United States' distribution pattern
- Methodological Debate
  - Heteroskedasticity
  - The high number of zeros
- Diverse Determinants
  - Needs
  - Economic interests of donors
  - Political interests of donors
  - Good governance



# Food Aid Definition

«three core characteristics that distinguish food aid from other forms of assistance: the international sourcing of concessional resources in the form of or for the provision of food» p.5



BARRETT, Christopher B. et Daniel G. MAXWELL, 2005, «Food Aid After Fifty Years, Recasting its Role», Londres, Routledge, 336 p.

## Why a Gravity Model ?

- Concessional food sale as food aid
- Major beneficiaries of food aid by direct transfer are:
  - Agribusinesses
  - Transport and logistics businesses
- Some donors admit to give food aid to boost future trade flows
- Distance captures transport costs and unfamiliarity (Huang, 2007)



# Factors conditioning Food Aid Flows

## – Gravity

- H1: Donor countries provide higher volumes of food aid to countries with more mouths to feed;
- H2: Donor countries provide higher volumes of food aid to countries that are geographically closer to them;

## – Needs

- H3: Donor countries provide more food aid to countries with greater needs;

## – Economic Interests of Donors

- H4: Donor countries provide higher volumes of food aid to countries they trade more with;
- H5: Donor countries provide higher volumes of food aid to countries with more liberalized economy;



# Factors conditionning Food Aid Flows

## – Good Governance

- H6: Donor countries provide higher volumes of food aid to countries with better governance;

## – Political interests of Donors

- H7: Donor countries provide more food aid to countries with whom they have political affinity.



# Empirical Specification and Estimation

- $E(\text{food aid}) = \alpha$ 
  - $B1(\text{CALOR}) - B2(\text{GDPCAP}) + B3(\text{TRADE}) + B4(\text{OPENK}) - B5(\text{DEMOC}) + B6(\text{UNVOTE}) - B7(\text{LNDIST}) + B8(\text{LNPOP}) + \epsilon_i$
- Negative Binomial Random effects
  - The group variable is the donor-recipient pair
  - 1932 groups for which we have 14 years of data
- Heckman
  - Without an exclusion variable
  - $\ln(\text{food aid})$
- Because of missing observations, we have a total of 26189 observations
- Other panel estimators considered (Tobit, Poisson, ZINB)

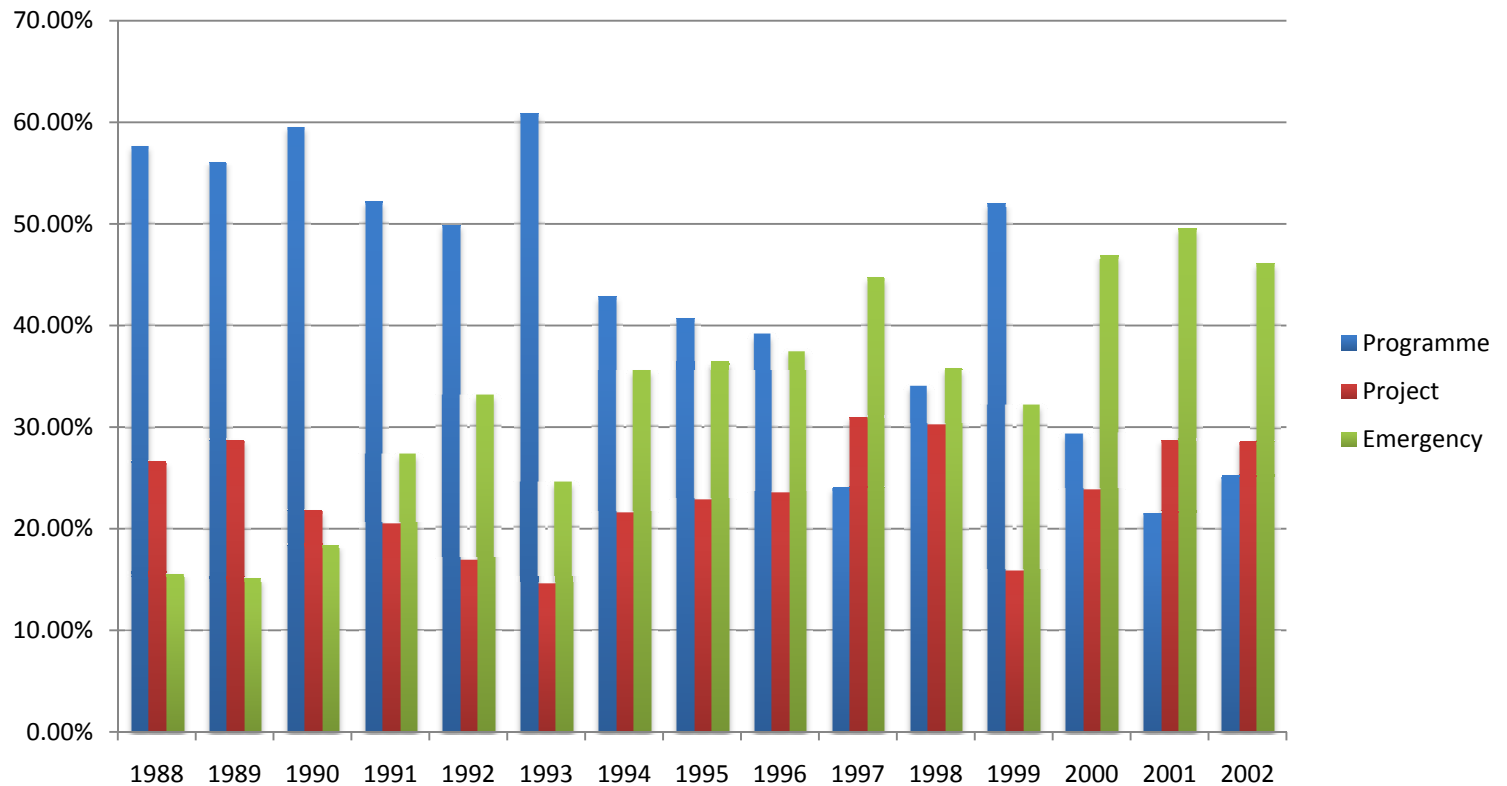


# Results

Variables	XTNBREG (Coeff)	XTNBREG (Elast)	Heckman (Coeff) Selection	Heckman (elast) Selection	Heckman (Coeff) Allocation	Heckman (Elast) Allocation
CALOR (-)	-.00037*** (.0000464)	-.93116	-.00047*** (.0000303)	-1.75141	-.00022** (.0000928)	
GDP CAP (-)	-.00056*** (.0000209)	-1.34271	-.00032*** (.0000112)	-1.13363	-.00035*** (.0000573)	
TRADE (+)	-6.0e-06*** (2.22e-06)	<b>-.06022</b>	-3.75e-07 (1.50e-06)	-.00062	.00003*** (5.08e-06)	
OPENK (+)	-.00109*** (.0003692)	<b>-.08732</b>	-.00143*** (.0002352)	-.172171	-.00041 (.0006097)	
DEMOC (-)	-.00970** (.0045218)	-.08013	.00690** (.003226)	.08001	-.00528 (.0081445)	
UNVOTE (+)	-1.11648*** (.0499367)	-.83064	-1.04696*** (.0393154)	-1.14611	-2.97035*** (.1412658)	
LN DIST (-)	-.26745*** (.0274052)	-.26745	-.167341*** (.0170826)	-.24545	.03935 (.0528762)	
LN POP (+)	.03112*** (.0102658)	.03112	.05607 *** (.0067805)	.08224	.25991*** (.0188718)	
WALD CHI2	1926.36		1141.21***			
Rho			.2085957**			



# Food Aid Categories Over Time



— Programme food aid

— Project food aid

— Emergency food aid



# Programme

Variables	Nbreg (xt) (Coeff) Prog.	Nbreg (xt) (Elast) Prog.	Heckman (Coeff) Selection Prog.	Heckman (Elast) Selection Prog.	Heckman (Coeff) Allocation Prog.	Heckman (Elast) Allocation Prog.
<b>CALOR (-)</b>	<b>.00022**</b> (.0000951)	<b>-.55366</b>	<b>-.00005</b> (.0000436)	<b>-.3015886</b>	<b>.00058***</b> (.0001055)	
<b>GDP CAP (-)</b>	<b>-.00043***</b> (.0000442)	<b>-1.03101</b>	<b>-.00022***</b> (.0000155)	<b>-1.199638</b>	<b>-.00007</b> (.0001017)	
<b>TRADE (+)</b>	<b>3.93e-06</b> (3.02e-06)	<b>-.00394</b>	<b>4.05e-06**</b> (1.67e-06)	<b>.0105241</b>	<b>-.00001</b> (7.60e-06)	
<b>OPENK (+)</b>	<b>-.00046</b> (0.0009668)	<b>-.03685</b>	<b>-.00144***</b> (.0004004)	<b>-.270821</b>	<b>.00203</b> (.0012421)	
<b>DEMOC (-)</b>	<b>-.04352***</b> (.0110876)	<b>-.35952</b>	<b>-.02638***</b> (.0048761)	<b>-.4763264</b>	<b>-.03722**</b> (.0174642)	
<b>UNVOTE (+)</b>	<b>-.76857***</b> (.0882719)	<b>0.5718</b>	<b>-1.11019***</b> (.0463254)	<b>-1.893625</b>	<b>-2.05140***</b> (.4341464)	
<b>LN DIST (-)</b>	<b>-.04979</b> (.0612496)	<b>-.04979</b>	<b>-.16483***</b> (.0249885)	<b>-.3767098</b>	<b>-.018778</b> (.0918728)	
<b>LN POP (+)</b>	<b>-.107010***</b> (.0253916)	<b>-.107010</b>	<b>-.02791***</b> (.0101166)	<b>-.0637965</b>	<b>.32792***</b> (.0323267)	
<b>WALD CHI2</b>	<b>186.74***</b>		<b>364.68***</b>			
<b>Rho</b>			<b>.077214*</b>			



# Emergency

Variables	Nbreg (xt) (Coeff) Emerg.	Nbreg (xt) (Elast) Emerg.	Heckman (Coeff) Selection Emerg.	Heckman (Elast) Selection Emerg.	Heckman (Coeff) Allocation Emerg.	Heckman (Elast) Allocation Emerg.
<b>CALOR (-)</b>	<b>-.00084***</b> (.0000662)	<b>-2.11398</b>	<b>-.00066***</b> (.0000324)	<b>-2.87663</b>	<b>-.00101***</b> (.000203)	
<b>GDPGAP (-)</b>	<b>-.00003**</b> (.0000161)	<b>-0.07193</b>	<b>-.00004***</b> (5.64e-06)	<b>-.19039</b>	<b>-.00001</b> (.0000258)	
<b>TRADE (+)</b>	<b>5.31e-07</b> (2.45e-06)	<b>-.00053</b>	<b>2.38e-06</b> (1.51e-060)	<b>.00463</b>	<b>.00002***</b> (5.69e-06)	
<b>OPENK (+)</b>	<b>-.00091</b> (.0005852)	<b>-.07291</b>	<b>-.00077***</b> (.0002804)	<b>-.10876</b>	<b>.00102</b> (.0009495)	
<b>DEMOC (-)</b>	<b>.02535***</b> (.0068847)	<b>.20941</b>	<b>.02201***</b> (.0034467)	<b>.29791</b>	<b>.05841***</b> (.012855)	
<b>UNVOTE (+)</b>	<b>-.12386*</b> (.0734971)	<b>-.08306</b>	<b>-.46375***</b> (.0412591)	<b>-.59313</b>	<b>-1.66142***</b> (.1706668)	
<b>LNDIST (-)</b>	<b>-.11164***</b> (.0404592)	<b>-.11164</b>	<b>-.15497***</b> (.0188329)	<b>-.26558</b>	<b>.19957**</b> (.0784506)	
<b>LNPOP (+)</b>	<b>.00675</b> (.016572)	<b>.00675</b>	<b>.03923***</b> (.0077335)	<b>.06723</b>	<b>.08062***</b> (.028528)	
<b>WALD CHI2</b>	<b>333.90***</b>		<b>203.57***</b>			
<b>Rho</b>			<b>.2103432</b>			

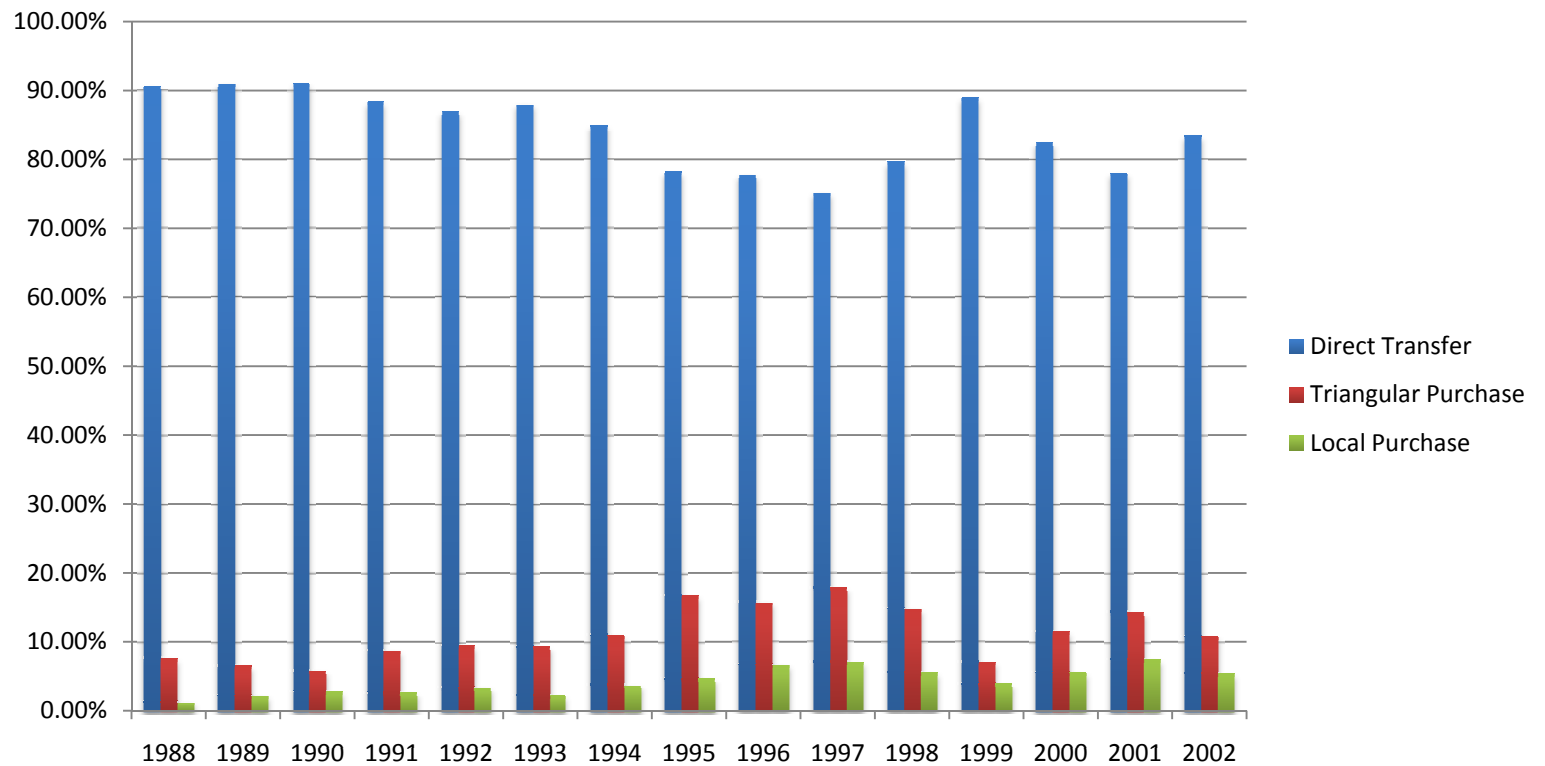


# Project

Variables	Nbreg (xt) (Coeff) Project	Nbreg (xt) (Elast) Project	Heckman (Coeff) Selection Project	Heckman (Elast) Selection Project	Heckman (Coeff) Allocation Project	Heckman (Elast) Allocation Project
ALOR (-)	-.00022*** (.000056)	-.55366	-.00025*** (.0000299)	-1.01919	-.00002 (.0001002)	
DPCAP (-)	-.00020*** (.0000173)	-.47954	-.00011*** (6.67e-06)	-.44681	-.00007** (.0000365)	
TRADE (+)	-8.2e-06*** (2.81e-06)	-.00823	-5.4e-06*** (1.88e-06)	-.00980	.00002*** (6.49e-06)	
OPENK (+)	-.00220*** (.0005188)	-.17626	-.00189*** (.0002616)	-.24730	-.00212** (.0008429)	
DEMOC (-)	<b>-.03582***</b> <b>(.0059906)</b>	<b>-.29591</b>	<b>-.01359***</b> <b>(.0032962)</b>	<b>-.171358</b>	<b>-.02882***</b> <b>(.0100272)</b>	
UNVOTE (+)	-1.17441*** (.0596312)	-.87374	-.97541*** (.0383965)	-1.16170	-2.74695*** (.2275522)	
LNDIST (-)	-.38814*** (.0341214)	-.38814	-.16168*** (.0173652)	-.25801	-.016007 (.0663462)	
LNPOP (+)	-.00431 (.0138288)	-.00431	.02559*** (.0071139)	.04084	.27406*** (.0215682)	
WALD CHI2	667.08***		638.56***			
Rho						



# Food Aid by Delivery Mode



— Direct transfer

— Triangular purchase

— Local purchase



# Direct Transfer

Variables	Nbreg (xt) (Coeff) D.T.	Nbreg (xt) (Elast) D.T.	Heckman (Coeff) Selection D.T.	Heckman (Elast) Selection D.T.	Heckman (Coeff) Allocation D.T.	Heckman (Elast) Allocation D.T.
<b>CALOR (-)</b>	<b>-0.00026***</b> (.000051)	<b>-0.65433</b>	<b>-0.00030***</b> (.0000293)	<b>-1.18435</b>	<b>-0.00001</b> (.0001169)	
<b>GDPGAP (-)</b>	<b>-0.00027***</b> (.0000176)	<b>-0.64738</b>	<b>-0.00014***</b> (6.99e-06)	<b>-0.51711</b>	<b>-0.00015***</b> (.0000495)	
<b>TRADE (+)</b>	<b>-9.2e-06***</b> (2.49e-06)	<b>-0.00923</b>	<b>-1.25e-06</b> (1.49e-06)	<b>-0.00218</b>	<b>.00002***</b> (5.66e-06)	
<b>OPENK (+)</b>	<b>-0.00160***</b> (.0004635)	<b>-0.12819</b>	<b>-0.00158***</b> (.0002506)	<b>-0.19850</b>	<b>-0.00017</b> (.0008576)	
<b>DEMOC (-)</b>	<b>-0.00395</b> (.0055579)	<b>-0.03263</b>	<b>.00443</b> (.0032229)	<b>.05374</b>	<b>.01374</b> (.0102364)	
<b>UNVOTE (+)</b>	<b>-1.40888***</b> (.0535857)	<b>-1.04819</b>	<b>-1.21607***</b> (.0382384)	<b>-1.39177</b>	<b>-3.39887***</b> (.3153068)	
<b>LNDIST (-)</b>	<b>-0.25232***</b> (.0314962)	<b>-0.25232</b>	<b>-0.18955***</b> (.0171494)	<b>-0.29066</b>	<b>.00134</b> (.0769109)	
<b>LNPOP (+)</b>	<b>-0.00454</b> (.0128151)	<b>-0.00454</b>	<b>.00651</b> (.0069079)	<b>.00999</b>	<b>.23316***</b> (.022204)	
<b>WALD CHI2</b>	<b>1165.11***</b>		<b>674.59***</b>			
<b>Rho</b>			<b>.1376938</b>			



# Triangular Purchase

Variables	Nbreg (xt) (Coeff) T.P.	Nbreg (xt) (Elast) T.P.	Heckman (Coeff) Selection T.P.	Heckman (Elast) Selection T.P.	Heckman (Coeff) Allocation T.P.	Heckman (Elast) Allocation T.P.
CALOR (-)	-.00047*** (.0000772)	-1.18282	-.00051*** (.7851057)	-2.428939	-.00045* (.0002556)	
GDPGAP (-)	-.00006*** (.0000171)	-.14386	-.00004*** (6.08e-06)	-.2047324	-.00002 (.0000304)	
TRADE (+)	.00001* (7.05e-06)	-.01004	1.61e-06 (2.07e-06)	.0034131	.00002** (.0000104)	
OPENK (+)	-.00231*** (.0007071)	-.18506	-.00157*** (.000313)	-.238686	-.00290** (.001208)	
DEMOC (-)	.00280 (.0081063)	.02313	.01913*** (.0037547)	.2806786	.04021*** (.0148401)	
UNVOTE (+)	<b>.82785 ***</b> <b>(.1237747)</b>	<b>.61591</b>	<b>.18639***</b> <b>(.0037547)</b>	<b>.258348</b>	<b>1.10912***</b> <b>(.2109157)</b>	
LNDIST (-)	.04695 (.0514977)	.04695	-.09983*** (.0202892)	-.1854033	.31369*** (.0883198)	
LNPOP (+)	-.03927* (.0193328)	-.03927	-.00355 (.008353)	-.0066077	-.01122 (.0277851)	
WALD CHI2	179.38***		55.94***			
Rho			.1492265			



# Local Purchase

Variables	Nbreg (xt) (Coeff) Emerg.	Nbreg (xt) (Elast) Emerg.	Heckman (Coeff) Selection Emerg.	Heckman (Elast) Selection Emerg.	Heckman (Coeff) Allocation Emerg.	Heckman (Elast) Allocation Emerg.
<b>CALOR (-)</b>	<b>-.00076***</b> (.0000957)	1.91265	<b>-.00055***</b> (.0000387)	<b>-2.76353</b>	<b>-.00053*</b> (.0003094)	
<b>GDP CAP (-)</b>	<b>-.00001</b> (.000021)	<b>-.02398</b>	<b>-.00002***</b> (6.60e-06)	<b>-.13793</b>	<b>-.00002</b> (.0000299)	
<b>TRADE (+)</b>	<b>-4.02e-06</b> (6.96e-06)	<b>-.00403</b>	<b>-1.43e-06</b> (2.28e-06)	<b>-.00330</b>	<b>.00002**</b> (.0000109)	
<b>OPENK (+)</b>	<b>-.00347***</b> (.000919)	<b>-.27800</b>	<b>-.00189***</b> (.000376)	<b>-.30748</b>	<b>-.00286*</b> (.0016642)	
<b>DEMOC (-)</b>	<b>-.06077***</b> (.0098969)	<b>-.50203</b>	<b>-.01713***</b> (.0042242)	<b>-.26400</b>	<b>-.04967***</b> (.0174255)	
<b>UNVOTE (+)</b>	<b>.28514**</b> (.1464869)	<b>.21214</b>	<b>.06179</b> (.057119)	<b>.09087</b>	<b>.24023</b> (.2508804)	
<b>LNDIST (-)</b>	<b>-.51849***</b> (.0629256)	<b>.51849</b>	<b>-.16927***</b> (.0217847)	<b>-.33269</b>	<b>-.05354</b> (.1269707)	
<b>LNPOP (+)</b>	<b>.06300***</b> (.0237742)	<b>.06300</b>	<b>.07673***</b> (.0095716)	<b>.15081</b>	<b>.10692***</b> (.0538003)	
<b>WALD CHI2</b>	<b>175.78***</b>		<b>21.09***</b>			
<b>Rho</b>			<b>.3256774</b>			



# Conclusion

## – Gravity Model

- Robust

## – Food Aid by Category

- Democracy
- Calories

## – Food Aid by Delivery Mode

- Distance, not only transportation cost matters
- United Nations votes



Thank you !  
Merci!

