

MIGRATION, THE FINANCIAL CRISIS, AND CHILD GROWTH IN RURAL GUATEMALA

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Motivation

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- International migration from and remittances to Latin America and the Caribbean are substantial
 - Emigration from LAC 5.1% in 2000; 5.5% from Guatemala with vast majority (~ 1.5 M in total) to U.S. (Hanson and McIntosh 2012)
 - Remittances to LAC ~\$65B annually; > 10% of GDP in countries like Guatemala (Mohapatra et al., 2010) and apparently growing (Clemens and McKenzie 2014)
- Growing rigorous evidence of the important effects of such migration & remittances on households and individuals in them (Hildebrandt and McKenzie 2005; Yang 2008; McKenzie et al 2010; Stillman et al 2012; this conference)
 - Includes risk management and insurance functions (Stark and Bloom 1985; de Brauw 2011; Yang and Choi 2007)
- Consequently, need to know what happens when these mechanisms “break down”, as they did to a large extent during the recent U.S. financial crisis.
 - Still able to insure?

Research question

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- In a context with high poverty, high outmigration, and severe undernutrition, we focus on a long-term indicator of individual well-being, child height-for-age z scores (HAZ) and ask:

What was the impact of the financial crisis on child nutritional status in migrant sending Guatemalan households?

Preview of methodology

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- Use two rounds of panel data (2008 and 2012)
 - Before and after the financial crisis
- Treat the crisis as exogenous from the perspective of rural Guatemalans
- Intuition: Non-migrant households (as measured prior to the crisis) were less exposed to, and therefore would have been less affected by the crisis, than migrant households → DD
- But reasonable common trends? Spillover effects?
- To bolster identification, extend DD exploiting patterns of child growth in early life (Duflo 2003; Carletto et al. 2011), contrasting those under 3 years of age with those over 3 → DDD

Preview of main findings

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- In a region with high poverty, high undernutrition, and substantial international outmigration:
- Clear (over time) reductions in migration and remittances
- Migrant household well-being declined relatively more than non-migrant (e.g. 25% reduction in per capita expenditures), though given large prior “advantage” they were not made worse off
- HAZ of children under 3 y at baseline in migrant households declined 0.5 SD relative to non-migrant children, though given large prior “advantage” they were not made worse off
- Contribution: Rigorous evidence of the effect of the crisis beyond U.S. border

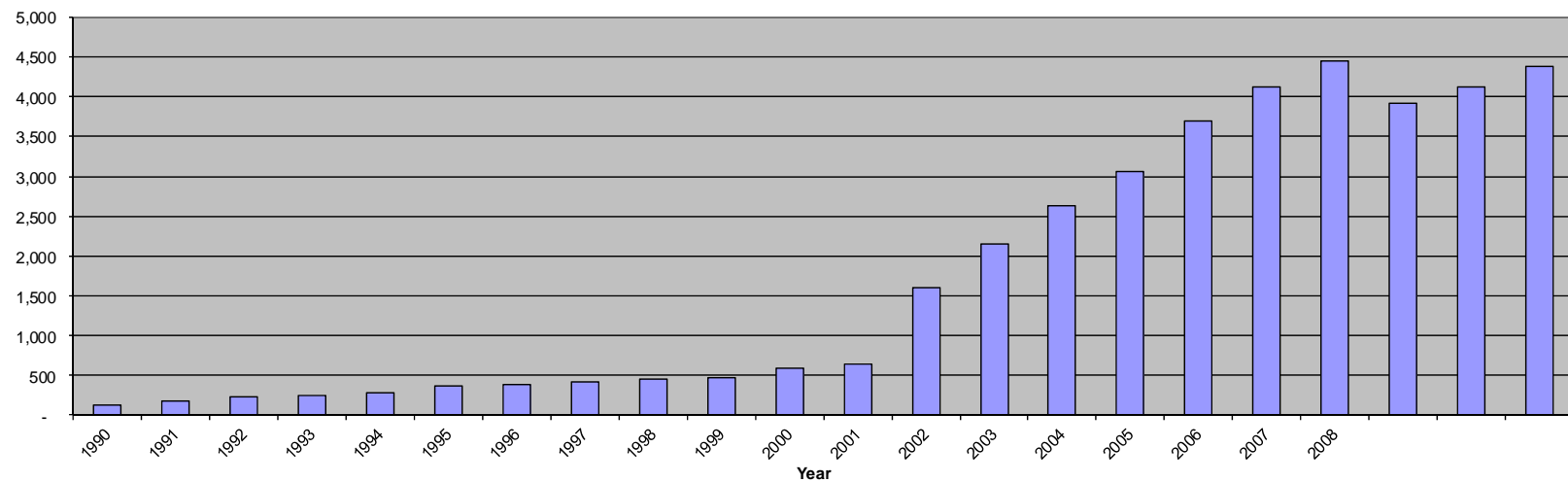
Background

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- Importance of migration and remittances
 - ▣ ca. 200 million migrants in the world
 - ▣ \$64 billion in remittances to LAC in 2008
 - ▣ Guatemala: \$4.3 billion in 2007 (Ratha and Mohapatra, 2009)
 - > 10% of Guatemalan GDP (\$33.4b)
 - Increasing rapidly in recent years (e.g., 7 times the value of 2001) – notice if this is an artifact of measurement, decline after 2008 is understated

Annual remittances to Guatemala 1990-2011, Millions US\$

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Source: Ratha and Mohapatra (2009) and Orozco 2012

Some related literature

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- Effects of migration (or remittances) - approaches
 - ▣ Instrumental variables (Hildebrandt and McKenzie 2005; Mansuri 2006)
 - ▣ Exploiting lotteries (various by Gibson, McKenzie and Stillman)
 - ▣ Exchange rate shocks (Yang and coauthors)
 - ▣ Randomized treatments (Yang and coauthors)
- Aggregate shocks and child outcomes
 - ▣ Food prices (de Brauw 2011)
 - ▣ GDP/currency effects on human capital (Frankenberg et al 2003; McKenzie 2003; Ferreira and Schady 2009; Baird et al. 2011; Friedman and Schady 2013)
- Financial crisis and its effects (Inchauste and Stein 2013; Duryea and Morales 2011)

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Context and data

Study sites

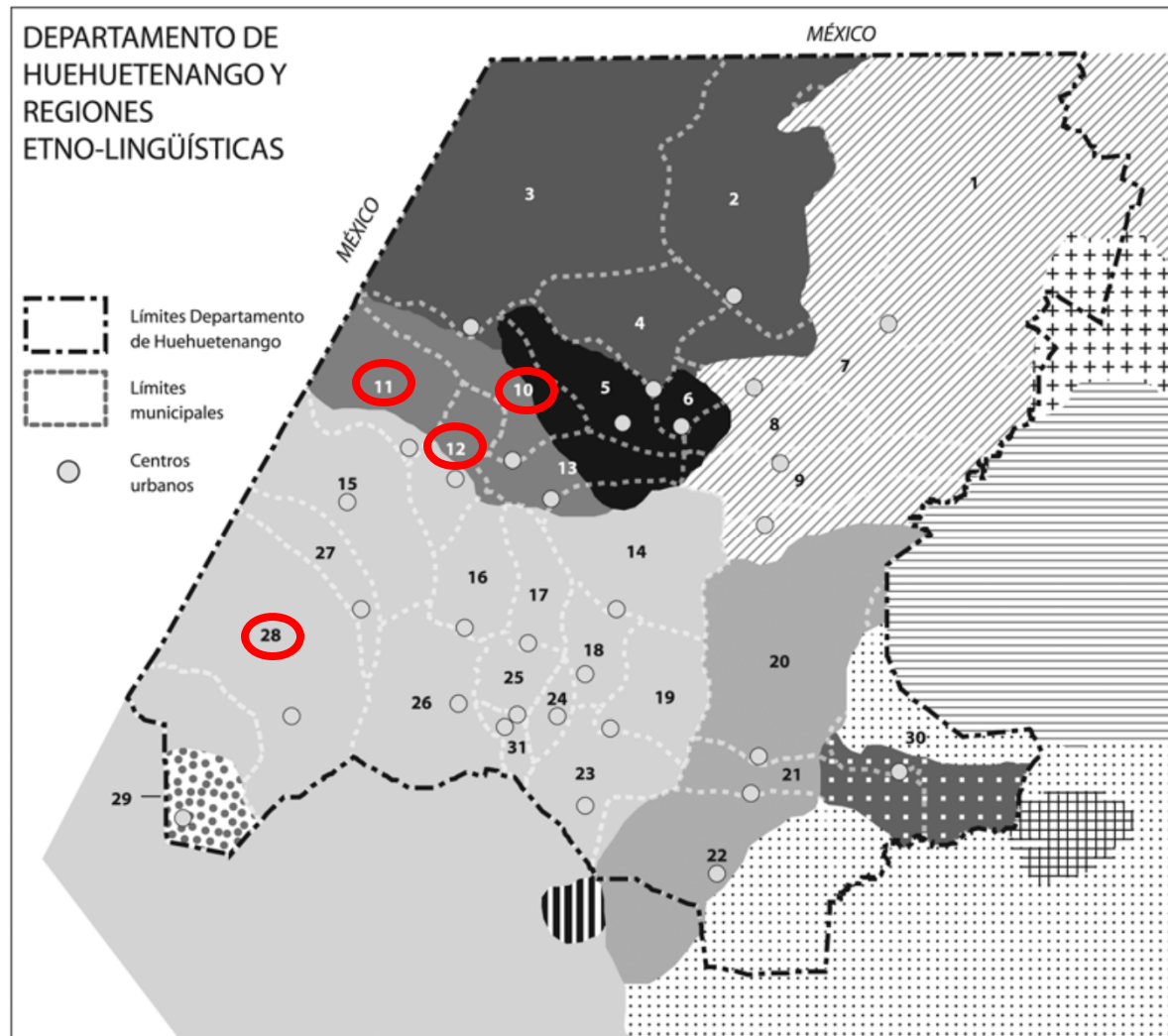
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- Northwestern Guatemala
 - Mixed self-reported ethnic background (45% Mam; 6% Popti; 49% Ladino)
 - Remote, minimal infrastructure
 - History of migration to both Mexico & U.S.
- 52 communities in 4 municipalities in northwest Guatemala
- Community census in early 2008
 - ~5,700 households interviewed including whether had migrants
 - ~1/3 of households with a migrant (“rite of passage” for young men)



Study municipalities

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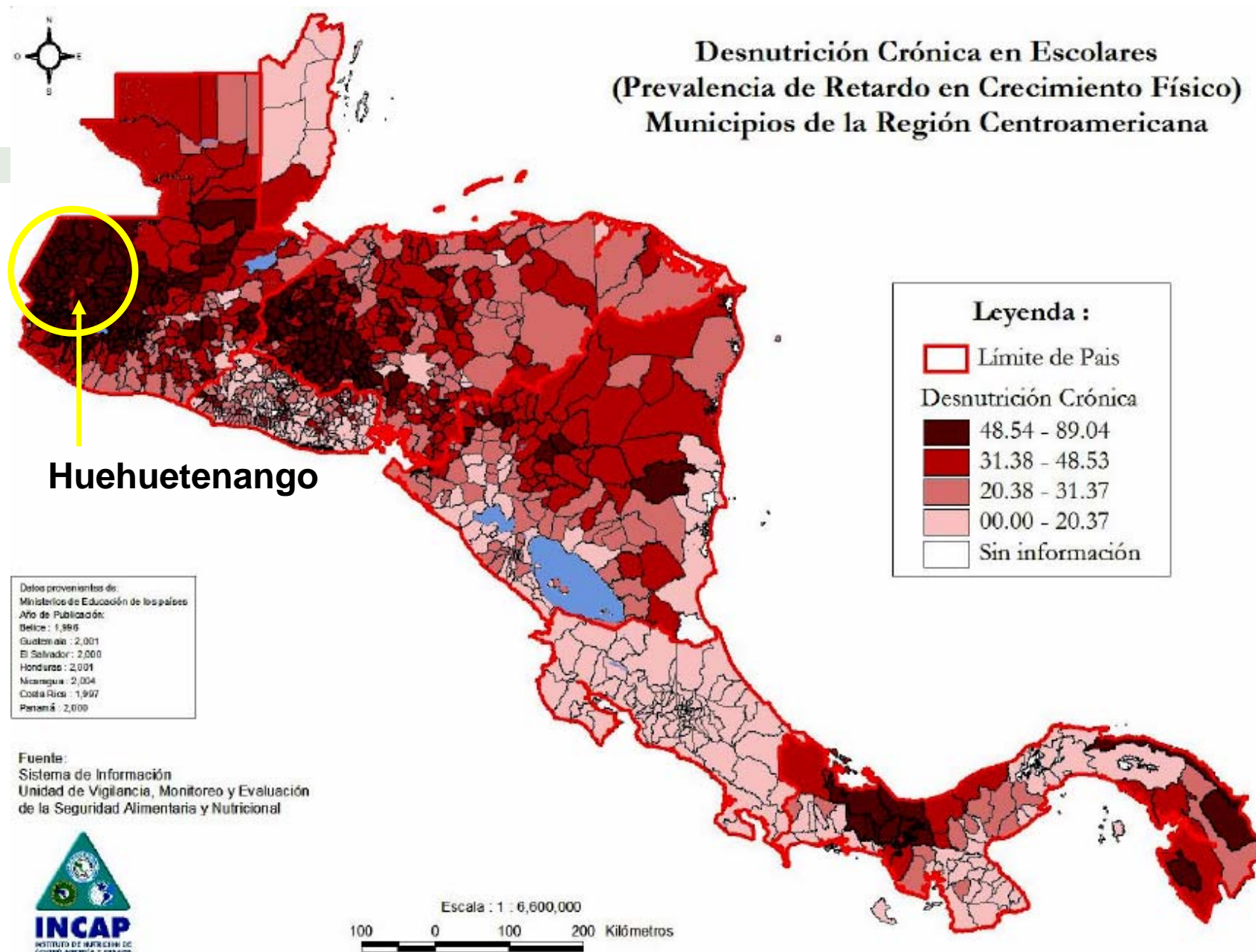
Context

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- Poverty
 - National: 51% in 2006 (56.2 % in 2000)
 - Northwest region: 75.6% in 2006 (82.1% in 2000)
 - Huehuetenango: 84.2% in 2006
 - **Our sample: 72% in 2008**
- Stunting for under five year olds
 - National: 45.6% in 2008
 - Huehuetenango: 62.8% in 2008
 - **Our sample: 61% in 2008**

Sources: LSMS 2000 & 2006; INCAP; World Bank 2003, 2008

Desnutrición Crónica en Escolares (Prevalencia de Retardo en Crecimiento Físico) Municipios de la Región Centroamericana



Panel Survey 2008 & 2012 (IRMISAN)

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- The Impact of Migration and Remittances on Food and Nutrition Security Study (IRMISAN)
- Target sample 1248 in 2008
 - ▣ 12 migrant & 12 non-migrant (from census) per community
 - ▣ Interviewed 1222 (98%)
- 4-community follow-up in 2009 and 2010
 - ▣ Qualitative & quantitative
 - Focus groups
 - Semi-structured interviews with returned migrants
 - Short quantitative survey
- 2012 Follow-up (targeting all 1222 from 2008)
 - 1127 (92% of 1222, 90% of 1248)
 - 181 Split-off households followed, so 1308 separate household surveys in 2012

Survey instrument

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- Follows LSMS structure
 - (Demographics, Dwelling characteristics, Education, Health, Consumption, Expenditures, Income, etc.)
- Expanded modules on Migration
 - International migration history
 - Past (household members with past migration experience)
 - Current (household members, head, spouse, and all children of head and spouse living abroad)
 - All siblings of head and spouse
- Expanded Food Security
 - Child anthropometrics: 0-6 in 2008 & 0-10 in 2012
 - Food security module (not yet explored in this paper)
 - Subjective well-being and perceptions (not yet explored in this paper)

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Identification strategy

DD model

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$$\Delta y_i = \beta_0 + \delta_{DD} m_{h0} + \beta_{ind} \mathbf{X}_{i0} + \beta_{hh} \mathbf{X}_{h0} + \beta_{com} \mathbf{X}_{c0} + \Delta u_i$$

where

- Δy_i is the difference over time (2012–2008) in outcome y for individual i (in household h) – individual FE differenced out
- m_{h0} is an indicator of whether the household h in which individual i lived in 2008 (at baseline) was a migrant household, and
- $\mathbf{X}_{i0}, \mathbf{X}_{h0}, \mathbf{X}_{c0}$ vectors of 2008 individual-, household-, and community-level controls
- Δu_i is the difference over time of an assumed idiosyncratic error term for individual i (in household h)

DD model: Key assumptions

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$$\Delta y_i = \beta_0 + \delta_{DD} m_{h0} + \beta_{ind} X_{i0} + \beta_{hh} X_{h0} + \beta_{com} X_{c0} + \Delta u_i$$

- δ_{DD} is DD
- Common trends
 - change over time in outcomes for individuals in non-migrant households represents change over time that would have been experienced in migrant households had there not been a crisis
- No spillovers
 - Non-migrant households were themselves unaffected by the crisis

Hold on there, cowboy

DDD model

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$$\Delta y_i = \beta_0 + \delta_{DD} m_{h0} + \beta_{u3} \text{under3}_{i0} + \delta_{DDD} m_{h0} * \text{under3}_{i0} \\ + \beta_{ind} X_{i0} + \beta_{hh} X_{h0} + \beta_{com} X_{c0} + (\alpha_h) + \Delta u_i$$

□ under3_{i0} Indicator if individual i is <3 y in 2008

Growth “window of opportunity”

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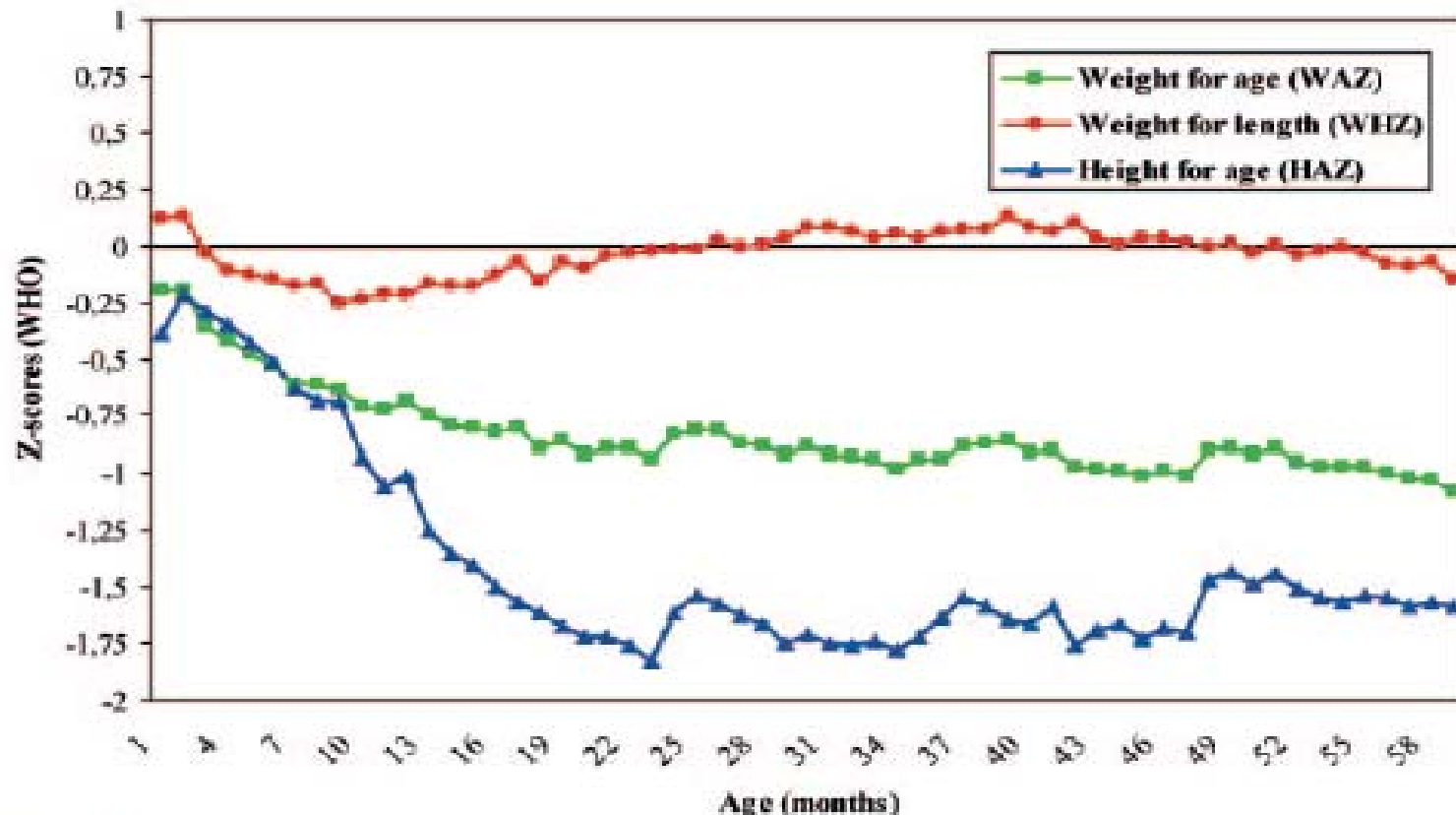


FIGURE 1

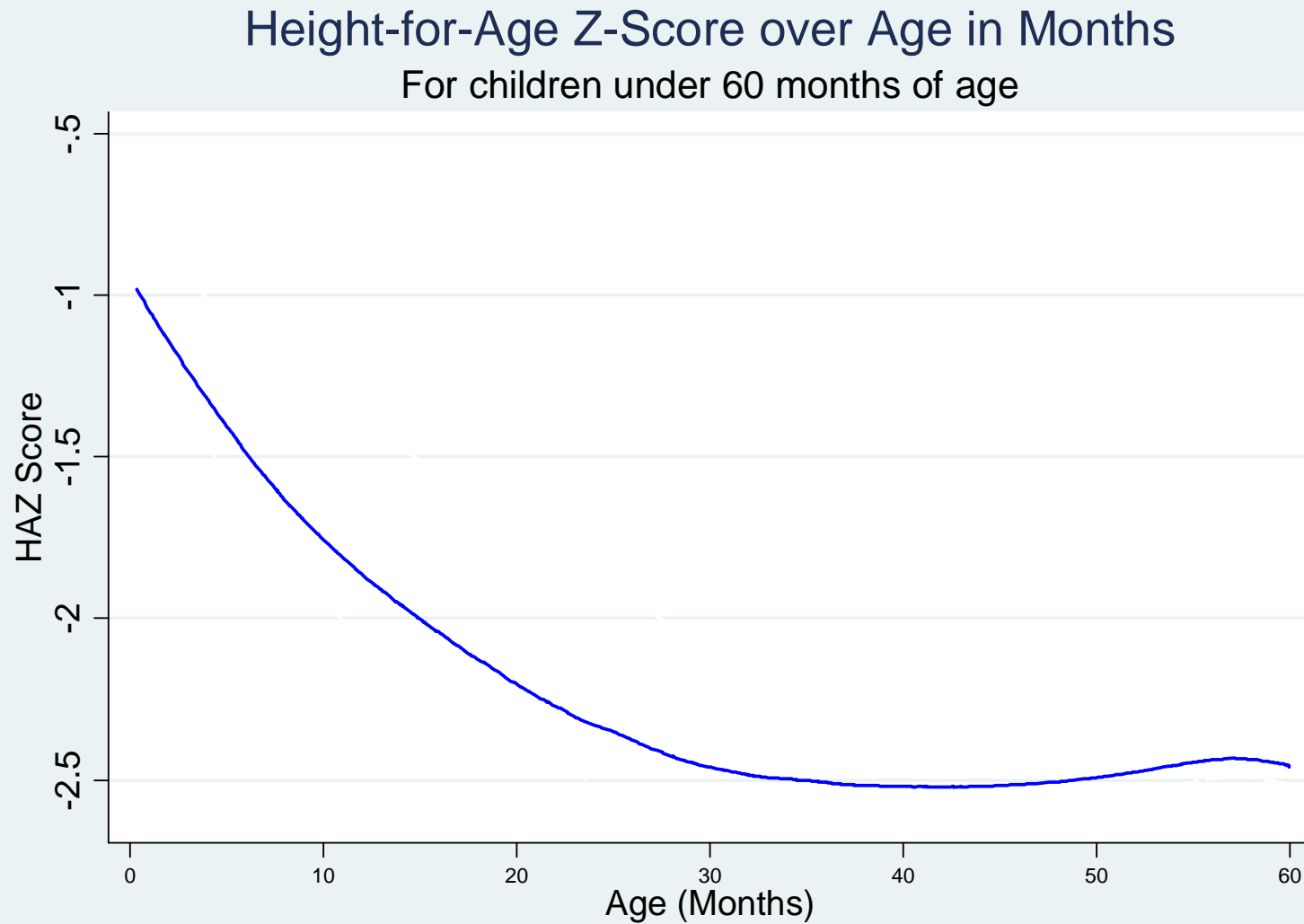
Mean anthropometric z scores according to age for all 54 studies, relative to the WHO standard (1 to 59 months).

Worldwide Timing of Growth Faltering: Revisiting Implications for Interventions

Cesar Gomes Victora, Mercedes de Onis, Pedro Curi Hallal, Monika Blössner and Roger Shrimpton

Pediatrics 2010;125:e473-e480; originally published online Feb 15, 2010;

Lowess HAZ By Age (2008)



DDD model

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$$\Delta y_i = \beta_0 + \delta_{DD} m_{h0} + \beta_{u3} \text{under3}_{i0} + \delta_{DDD} m_{h0} * \text{under3}_{i0} \\ + \beta_{ind} \mathbf{X}_{i0} + \beta_{hh} \mathbf{X}_{h0} + \beta_{com} \mathbf{X}_{c0} + (\alpha_h) + \Delta u_i$$

- under3_{i0} Indicator if individual i is <3 y in 2008
- α_h Household FE (some specifications) – HH time trend
- δ_{DDD} is DDD
- To summarize: DDD in which treat crisis as exogenous to households and exploit patterns of child growth
- Controls for individual-level FE, household-specific trends

Measuring/defining migration

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- At individual level, many approaches/possible definitions (Smith and Thomas 2003)
 - Time, Destination
 - Links to original household including remittance behavior
- → at HH level, even more (de Brauw and Carletto 2007)

- Our approach: Comprehensive measure
 - We have extensive information on migration experiences of head, spouse, and all children of either – these are the individuals we consider
 - Using histories, assess for individual in each calendar year whether they were in the U.S. (or elsewhere)
 - A migrant household is one in which there was at least one such migrant in 3 of the 4 years between 2005-2008
 - Links to age of child

Results

- ❑ Migration patterns
- ❑ Household level patterns
- ❑ Effect on child growth/nutritional status



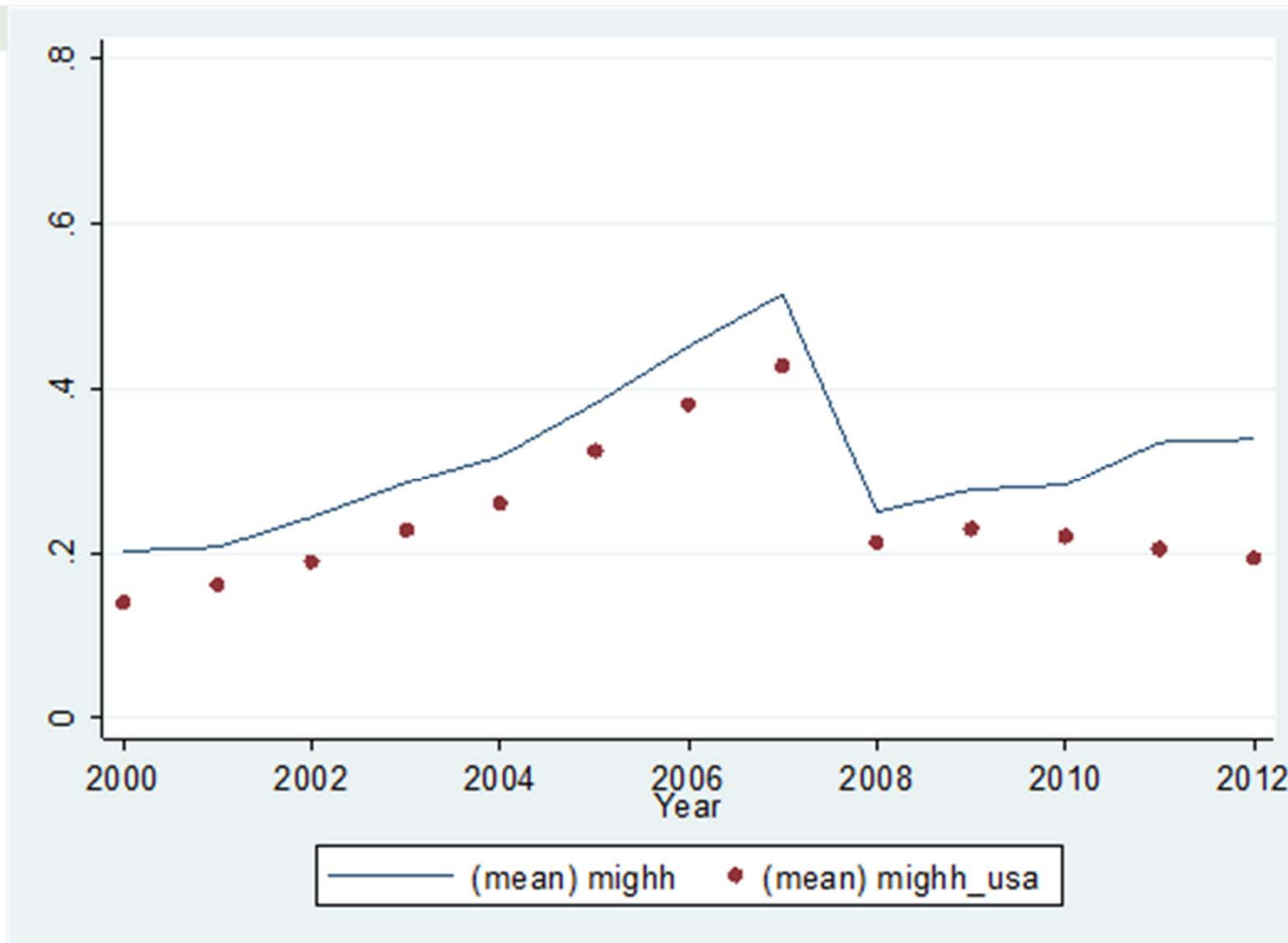
Rapid qualitative assessment (Saenz de Tejada 2009)

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- Objective: Investigate changes resulting from financial crisis
- One year after baseline qualitative work in 4 communities (1 per municipality)
 - 7 Focus groups
 - ~25 Semi-structured interviews (recently returned migrants)
 - Short quantitative assessment in ~100 survey households
- Message was clear: altered cost-benefit of migration
 - Increased travel cost and risk (both in Mexico and at U.S. border)
 - Decreased opportunity as a result of economic downturn
 - Return migration driven by lack of work (and some deportations)
 - Quantitatively, respondents overwhelmingly indicated that they believed obtaining work in the U.S. had become much more difficult and universally felt that laws and attitudes toward immigrants in the U.S. had worsened in the previous year
- All of which inhibiting migration (consistent with Hanson and McIntosh 2012; McKenzie et al. 2014)

Fraction of households w/ international migrant

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Household statistics by migration status & year: Household with child under 3 y (N=346)

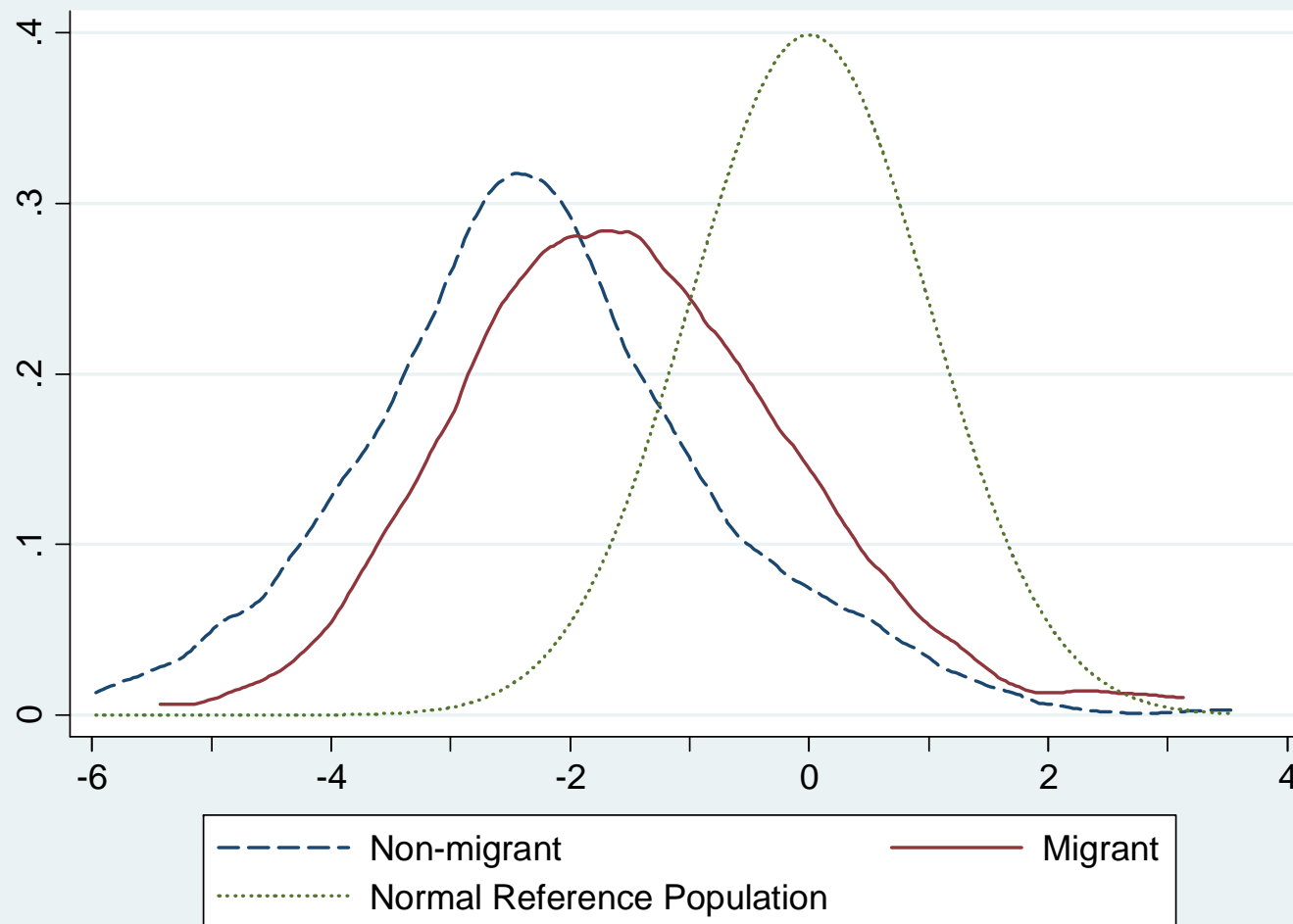
30		2008				2012			Double-Difference	
		Migrant	Non-migrant	Difference		Migrant	Non-migrant	Difference		
	Total expenditures (Q)	45430.48 (32235.11)	30762.01 (26677.75)	14668.47 (4136.54)	**	39255.49 (33704.59)	34257.87 (23569.04)	4997.623 (3837.35)	-9670.85 (3613.13)	**
	Log total expenditures	10.52 (0.63)	10.13 (0.62)	0.39 (0.09)	**	10.27 (0.89)	10.25 (0.63)	0.02 (0.09)	-0.38 (0.12)	**
	Per capita expenditures (Q)	5835.78 (4467.27)	4686.71 (3856.78)	1149.07 (588.15)	+	5170.24 (4064.95)	4966.73 (3806.60)	203.51 (456.77)	-945.56 (468.60)	*
	Log per capita expenditures	8.45 (0.66)	8.23 (0.65)	0.22 (0.09)	*	8.24 (0.89)	8.29 (0.66)	-0.05 (0.09)	-0.27 (0.10)	**
	Per capita food expenditures	2481.97 (1512.66)	2739.61 (2988.99)	-257.64 (246.22)		3042.41 (2214.85)	3102.29 (2130.56)	-59.88 (280.27)	197.76 (350.98)	
	Food share	0.50	0.59	-0.09 (0.03)	**	0.62	0.65	-0.03 (0.02)	0.06 (0.03)	+
	% receiving remittances	0.83	0.07	0.76 (0.05)	**	0.17	0.05	0.12** (0.04)	-0.65 (0.06)	**
	Remittances received (Q) unconditional	11574.44 (18113.34)	501.18 (3002.92)	11073.26 (2071.74)	**	3405.75 (15809.13)	791.74 (5350.36)	2614.008 (1751.01)	-8459.25 2625.58	**
	Remittances received (Q) conditional on receiving	13889.33 19027.47	7295.00 9271.97	6594.33 (3221.98)	*	19299.25 34218.84	12435.00 17946.60	6864.25 (9638.98)	269.92 (10005.4)	

Notes: N=346 households ** <0.01, *<0.05, +<0.10

Height-for-age z scores

Children under 3 y in 2008

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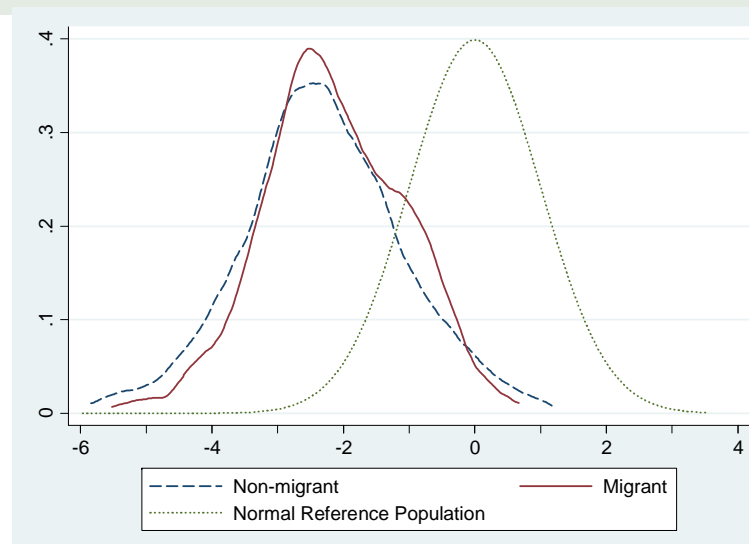
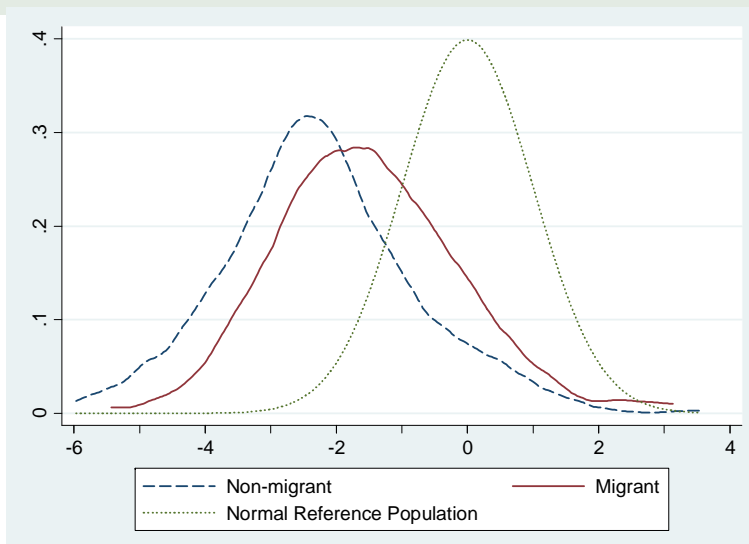
Height-for-age z scores

32

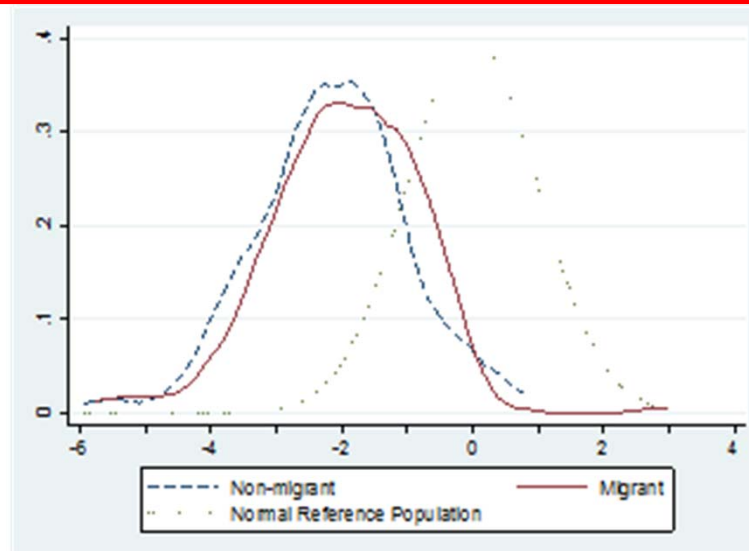
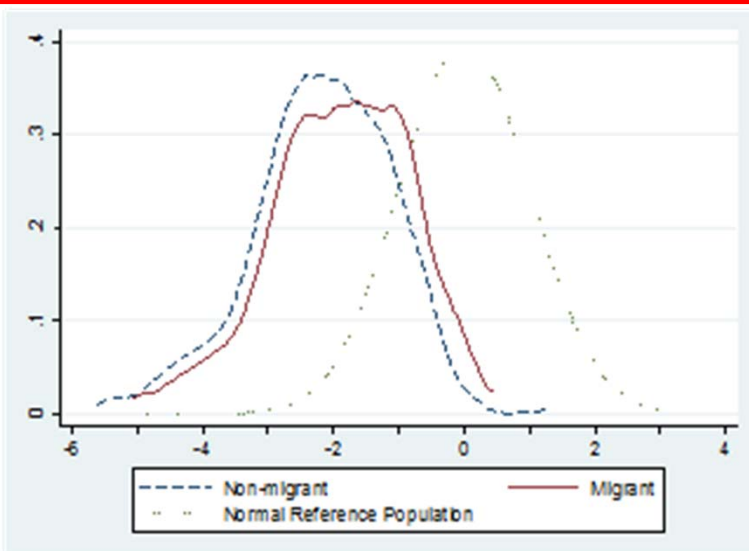
Children under 3 y (in 2008)

Children 3-6 y (in 2008)

2008



2012



DD effect of crisis on children <3y (T1B)

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	2008			2012			
	Migrant	Non-migr	Diff	Migrant	Non-migr	Diff	DD
HAZ	-1.582 (1.486)	-2.357 (1.459)	0.775** (0.16)	-2.019 (1.106)	-2.246 (1.066)	0.227* (0.111)	-0.548** (0.16)
WAZ	-0.766 (1.110)	-1.147 (1.115)	0.381** (0.13)	-1.213 (1.073)	-1.370 (1.046)	0.157 (0.164)	-0.224 (0.16)
Stunted (HAZ < -2)	0.402	0.629	-0.227** (0.05)	0.515	0.569	-0.054 (0.052)	0.173** (0.06)
Underweight (WAZ < -2)	0.155	0.217	-0.062 (0.04)	0.179	0.237	-0.058 (0.057)	0.005 (0.05)
N	97	318		97	318		

Notes: ** <0.01, * <0.05, + <0.10

Individual, household, and community controls

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- Additional controls (measured in 2008 unless *) include:
 - Male
 - Age in months (and its square)
 - Time in months between survey measurements*
 - Mother's and father's schooling
 - Logarithm of household size
 - Number of males (females) in each of three age groups (0-5, 6-15, 16-35)
 - Household head male, indigenous, education, and age
 - Whether household has: private piped water, cement floor, block walls, toilet
 - Logarithm of the number of rooms in the house
 - Whether household owns 1 or more hectares of agricultural land
 - Whether anyone in household benefited in past year from health program
 - Average community level per capita expenditures
 - Distances to nearest health center, primary school, and market

- Standard errors allowing for clustering at the community level

DD effect of crisis on children <3y w controls (T2)

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	HAZ			Stunted		
	(1)	(2b)	(2c)	(1)	(2b)	(2c)
Migrant (DD)	-0.548** (0.157)	-0.460* (0.201)	-0.655** (0.206)	0.173** (0.062)	0.138+ (0.081)	0.231** (0.085)
Male		0.461* (0.189)	0.556* (0.211)		-0.016 (0.066)	-0.079 (0.073)
% community migrants		-0.013 (0.012)			0.007+ (0.004)	
Intercept	0.111 (0.093)	7.881 (7.996)	10.463 (11.656)	-0.060 (0.037)	5.754 (4.064)	1.272 (5.470)
F-Stat p-value [N=415]	[0.001]	[<0.001]	[<0.001]	[0.007]	[<0.001]	[<0.001]
Additional Controls	No	Yes	Yes	No	Yes	Yes
Community-level FE	No	No	Yes	No	No	Yes

Notes: N=415 ** <0.01, *<0.05, +<0.10

DD effect of crisis on children (T3)

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	(1)	(2b)	(2c)		(1)	(2b)	(2c)
Children < 3 years old in 2008							
	HAZ				Stunted		
Migrant (DD)	-0.548**	-0.460*	-0.655**		0.173**	0.138+	0.231**
[N=415]	(0.157)	(0.201)	(0.206)		(0.062)	(0.081)	(0.085)
	WAZ				Underweight		
Migrant (DD)	-0.222	-0.081	-0.206		0.002	-0.032	0.006
[N=412]	(0.161)	(0.184)	(0.178)		(0.053)	(0.062)	(0.061)
Children 3-6 years old in 2008							
	HAZ				Stunted		
Migrant (DD)	0.062	0.126	-0.033		-0.060	-0.090	-0.062
[N=476]	(0.144)	(0.135)	(0.157)		(0.058)	(0.064)	(0.070)
	WAZ				Underweight		
Migrant (DD)	-0.032	-0.031	-0.028		-0.001	0.029	0.019
[N=466]	(0.114)	(0.123)	(0.129)		(0.042)	(0.050)	(0.051)
Additional Controls	No	Yes	Yes		No	Yes	Yes
Community-level FE	No	No	Yes		No	No	Yes

Notes: N=415 ** <0.01, * <0.05, + <0.10

DDD effect of crisis on children (T4)

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	HAZ					Stunted			
	(3a)	(3b)	(3c)	(3d)		(3a)	(3b)	(3c)	(3d)
Migrant	0.062 (0.144)	0.128 (0.142)	0.026 (0.152)			-0.060 (0.058)	-0.081 (0.064)	-0.061 (0.071)	
Child < 3 years	-0.044 (0.121)	0.380+ (0.207)	0.423* (0.203)	0.538* (0.228)		0.008 (0.044)	-0.044 (0.082)	-0.059 (0.081)	0.001 (0.103)
Migrant*Child (DDD)	-0.610** (0.205)	-0.584** (0.197)	-0.578** (0.203)	-0.594* (0.257)		0.233** (0.080)	0.216* (0.082)	0.245** (0.085)	0.270* (0.119)
Intercept	0.154+ (0.087)	8.851 (5.953)	17.743** (5.882)	20.037 (17.299)		-0.067+ (0.034)	3.429 (2.627)	-1.880 (3.106)	-3.634 (4.226)
Additional Controls	Basic	Yes	Yes	Yes		Basic	Yes	Yes	Yes
Community-level FE	No	No	Yes	Yes		No	No	Yes	Yes
Household-level FE	No	No	No	Yes		No	No	No	Yes

Notes: N=891 ** <0.01, *<0.05, +<0.10

Some robustness considerations

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- Alternative definitions for migrant household
- Alternative young age cutoffs (0-24, 0-30, 6-36m)
- Attrition concerns (~18% of children)
 - No significant difference between migrant/non-migrant
 - Controls for individual-level fixed-effects and time-varying household-level fixed effects
 - Minimal differences in baseline characteristics
 - Manski-like bounding exercise
- Examination of migration status when older group was young (i.e., 2002-2005)
- Cohort comparison using those born between survey rounds (DD on <3y in 2008 minus DD on <3y in 2012)

Attrition bounding exercise

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- Assign to attrited children in migrant households the 5th percentile in the non-migrant distribution
- And to attrited children in non-migrant households the 95th percentile in migrant distribution
- Both HAZ and stunting results hold; ~1/4 smaller but still significant (at 10%)

(Some of our possible) next steps

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- More digging on migration movement at household level
- “Continuous” measure of years with migrant in past four years
- Allowing possibility of spillovers to differ across household types
- Incorporating household-level shocks to explore insurance aspects for idiosyncratic shocks
- Mechanisms:
 - HH level: nutrition/food security, sanitation
 - Illness and health care seeking (Meredith et al 2013)
- And, of course, your suggestions ...

Summary of findings

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- In a region with high poverty, high undernutrition, and substantial international outmigration:
- Clear (over time) reductions in migration and remittances
- Migrant household well-being declined relatively more than non-migrant (e.g. 25% reduction in per capita expenditures)
 - Given large prior “advantage” they were not made worse off
 - Protected food expenditures
- HAZ of children under 3 y at baseline in migrant households declined 0.5 SD relative to non-migrant children, though given large prior “advantage” they were not made worse off
- Lack of effect on WAZ consistent with timing intensity of the crisis

Conclusions

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- Likely long-term consequences
 - Though does not mean no benefit, e.g., improved cognitive development during the period of substantial advantage
- At least some of the gains from migration were temporary in this context (unable to fully protect against this shock)
- Example identifying the (heterogeneous) effects of an aggregate shock

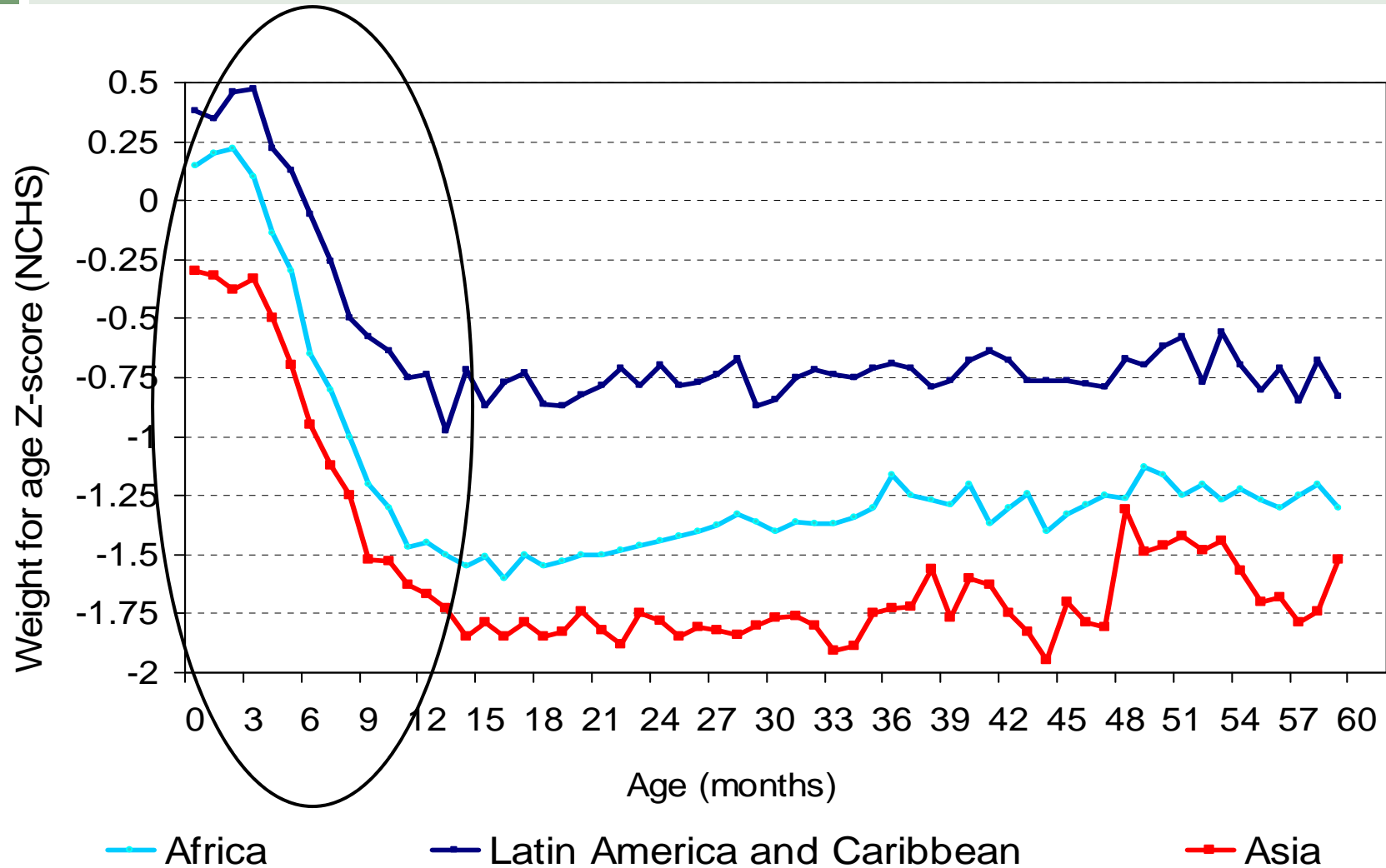
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Thank you / Questions or comments?

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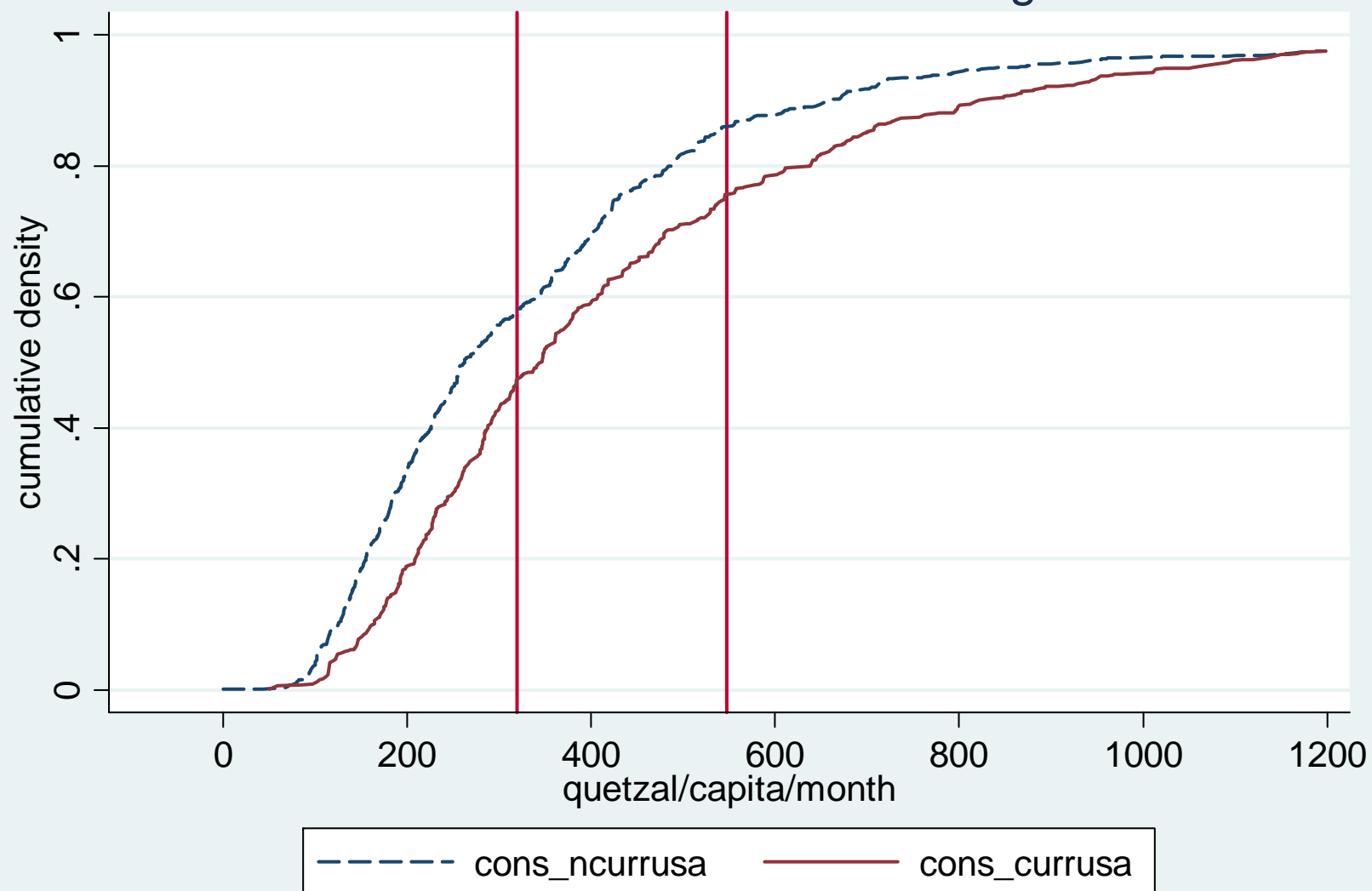
Additional slides

Period of most rapid growth and vulnerability to growth faltering



Shrimpton et al. 2001

CDF: Current vs Non-current US Migrant HHs



	Household had US migrant for 3-4 years from 2005-8		<i>Total</i>
	no	yes	
<i>Poverty Status</i>			
Non-Poor	15.1	27.9*	19.5
Poor	84.9	72.1*	80.5
Poor (not extreme)	34.7	35.6	35.0
Extreme poor	50.1	36.5*	45.5
<i>Total per capita expenditure shares</i>			
Health	7.7	10.0*	8.5
Utilities	16.0	15.6	15.9
Goods	16.1	16.1	16.1
Education	3.5	5.7*	4.3
Food	56.7	52.6*	55.3
<i>Dwelling characteristics</i>			
Access to sanitation			
flush	20.1	26.3*	22.2
septic tank	5.0	7.8*	5.9
latrine	58.6	53.3*	56.8
none	16.4	12.5*	15.0
Other characteristics			
dirt floor	60.4	36.5*	52.3
separate indoor kitchen	72.7	81.3*	75.6
refrigerator	19.1	29.7*	22.7
<i>n (households)</i>	776	446	1222
Share	65.9	34.1	

Table 2: Child descriptives

	All Children			Under-30 Months		
	Household had US migrant for 3-4 years from 2005-8			Household had US migrant for 3-4 years from 2005-8		
	no	yes	Total	no	yes	Total
<i>Share of vaccinated children:</i>						
Tuberculosis	94.4	90.5*	93.4	96.2	89.1*	94.3
Pentavalente (Tetanus, Diphtheria, Hepatitis B, Pertussis, Polio)	75.2	72.1	74.3	82.1	78.4	81.1
DPT (Diphtheria, Pertussis, Tetanus)	6.3	11.1*	7.6	1.2	2.5	1.6
Polio	87.1	81.9*	85.8	82.5	73.5*	80.2
Measles	75.8	71.7	74.7	55.4	44.9*	52.6
All Vaccines	58.9	54.2	57.6	47.7	41.1	46.0
<i>Morbidity</i>						
Diarrea	37.2	38.4	37.5	42.7	44.2	43.1
Respiratory infection	56.3	54.5	55.9	62.7	54.0	60.4
<i>Food Security</i>						
Moderate stunting	59.4	48.2*	56.5	56.0	30.2*	49.4
Severe stuntings	26.4	17.8*	24.2	25.3	9.2*	21.2
Wasting	3.5	3.0	3.4	6.2	2.7	5.3
Underweight	19.2	13.9*	17.9	19.9	7.1*	16.6
HAZ	-2.23	-1.84*	-2.13	-2.06	-1.17*	-1.83
WAZ	-1.25	-0.93*	-1.17	-1.17	-0.44*	-0.98
WHZ	0.10	0.32*	0.16	-0.04	0.37*	0.06
<i>n (children)</i>	822	327	1149	325	117	442
Share	73.6	26.4		73.8	26.2	

*Mean is significantly different from the alternative (p<.10)

Motivations (3)

- Rising food prices
 - “push” or “pull”
- Financial crisis
 - Returnees
 - Remittance flows (5-8% less in 2009)
 - New migrants
- Migration laws and attitudes towards migrants
 - Migration costs
 - Deportations

Methodology



- Migration is not random
- Longitudinal study
 - Before and After
 - With and Without (migration)
- 2008: baseline – household survey
- 2009: qualitative study and “tracking”
- 2010: second round of survey- panel

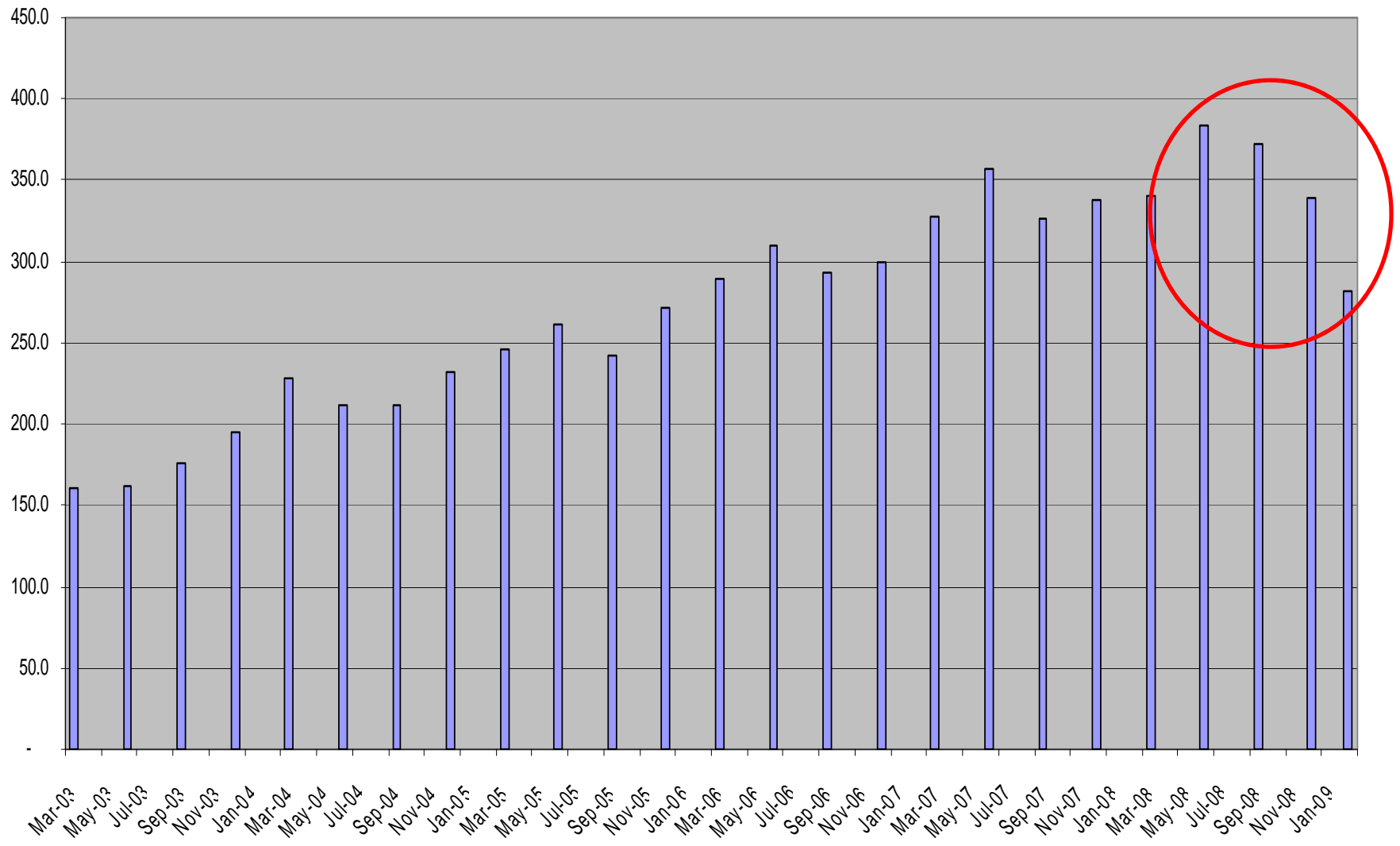
Empirical Approach (1): DD

- Impact of migration on children under 30m
 - Natural double-difference approach:
 - First diff:
 - HAZ Under 30 months, Migrant/Non-Migrant households
 - HAZ Over 30 months, Migrant/Non-Migrant households
 - Second diff:
 - Difference of differenced HAZs: Under 30/Over 30 Months
- Estimate:

$$Outcome = \beta_0 + \beta_1 Treatment + \beta_2 Post + \beta_{12}(Treatment * Post) + \varepsilon$$

$$HAZ_i = \alpha + \beta_1 Migrant_i + \beta_2 U30_i + \beta_{12}(Migrant_i * U30_i) + \beta_3 X_i + \varepsilon_i$$

Monthly remittances: 3/2002 - 1/2009



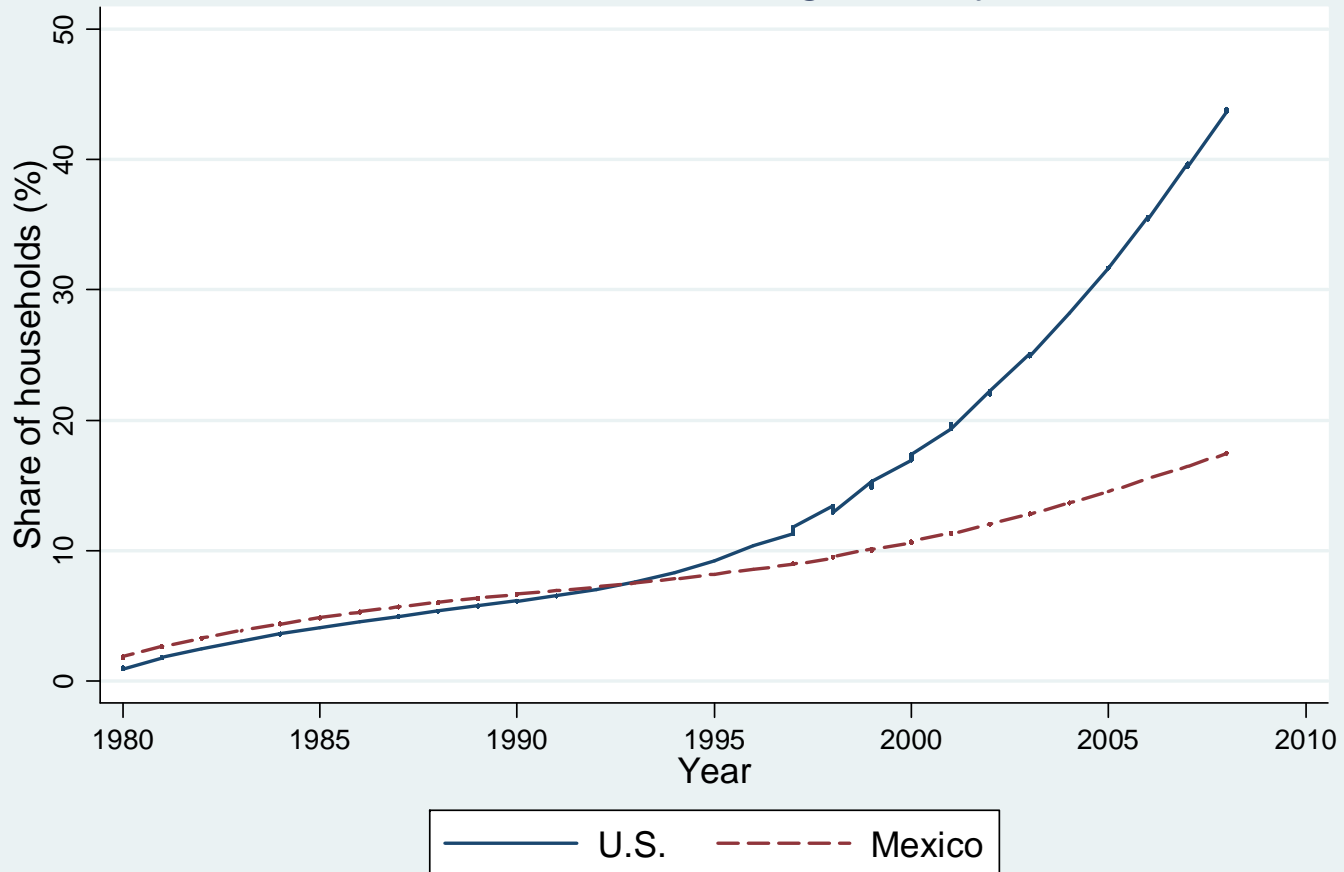
WHO ARE THE MIGRANTS/KIDS??

Conceptual Framework



- Migration/Remittances
- Transmission channels
 - Income (+)
 - Liquidity/credit & risk/insurance (NELM) (+)
 - Labor (-)
 - Childcare (-)
 - Knowledge about health and sanitation (+)

Share of households with migrants by destination



Lowess HAZ By Age

(Figure 6)

