

# Secondary Towns, Population and Welfare in Mexico

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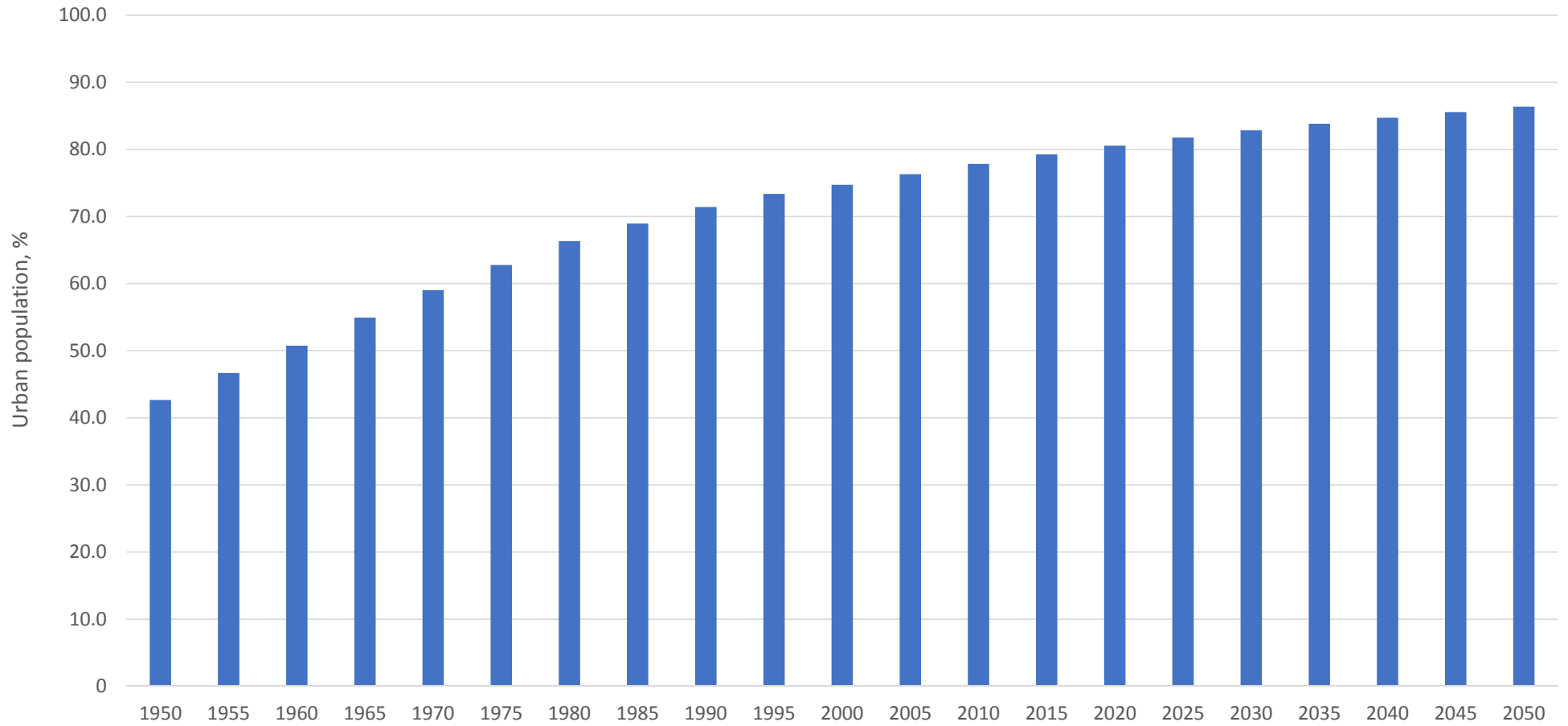
# Content

1. Background
2. Research questions
3. Results 1 – distribution of population by travel distance from urban
4. Models
5. Results 2 – urban effects on rural population growth
6. Results 3 – urban effects on rural wellbeing
7. Implications and conclusions

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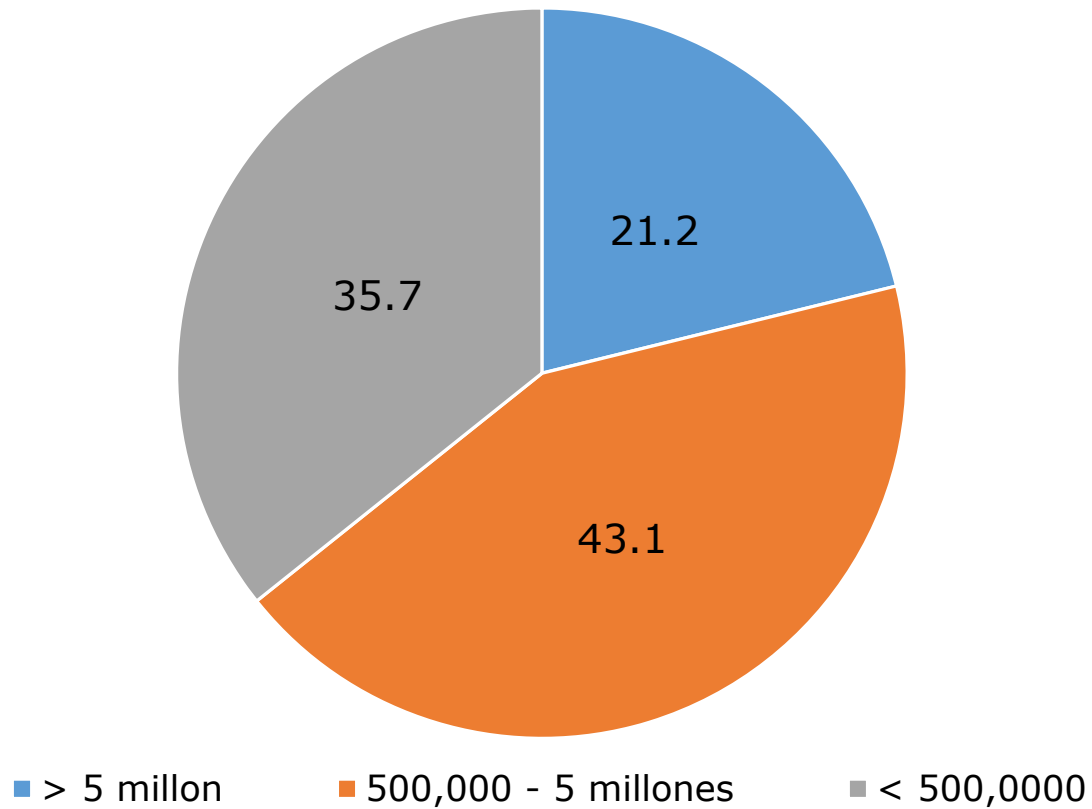
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# Mexico, an urbanized country



# Importance of small and medium cities

Percent of urban population by city size, 2015



## Research questions

1. What is the effect on the development opportunities and wellbeing of rural inhabitants, of living close to a small to medium urban center, compared to living close to a large city?
2. What are the effect of *changes* in small and medium cities on the development opportunities and wellbeing of rural inhabitants, compared with the effects of changes in large cities?

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## Data

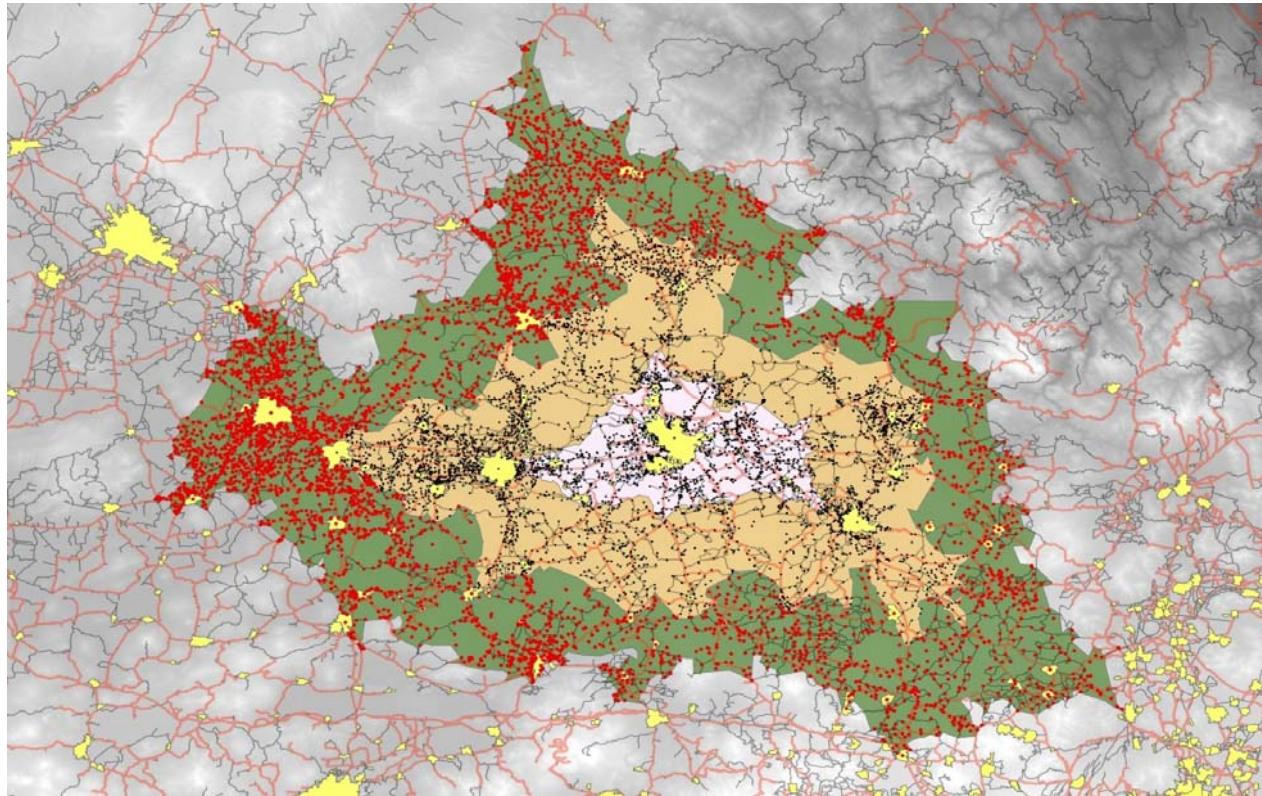
- Population census, 2010
  - 50,030 localities > 100 inhabitants = 97% of total population
- Urban “locality”
  - One town or city
  - A conurbation of two or more adjacent towns or cities
  - One metro region (two or more municipalities)
- National road data base
- ArcGIS Network Analyst software



## Hierarchy of localities

1.  $< 15,000$  (Type0) = rural
2. 15,000 to 50,000 (Type1)
3. 50,000 to 250,000 (Type2)
4. 250,000 to 350,000 (Type3)
5. 350,000 to 500,000 (Type4)
6. 500,000 to 1 million (Type5 )
7. 1 to 5 million (Type6)
8.  $> 5$  million (Type7)

## Isochrons 30', 60' y 90' from Querétaro



## Isochrons 30', 60' y 90' from main cities



## Distribution of population by rural, rural-urban, urban areas

	Hinterland 60' travel time		Urban		Total	
	Pop (x 1000)	Localities	Pop (x 1000)	Localities	Pop (x 1000)	Localities
< 15k	11,232	20,439			11,232	20,439
15k - 50k	6,707	9,480	2,226	332	8,933	9,812
50k - 250k	5,034	6,463	8,952	1,096	13,986	7,559
250k - 350k	851	760	3,586	387	4,437	1,147
350k - 500k	1,008	1,038	4,135	803	5,143	1,841
500k - 1m	2,276	2,427	16,319	2,762	18,595	5,189
1m - 5m	1,163	917	21,085	2,165	22,248	3,082
>5m	0	0	20,084	961	20,084	961
<b>Total</b>	<b>28,273</b>	<b>41,524</b>	<b>80,787</b>	<b>8,506</b>	<b>109,060</b>	<b>50,030</b>

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## Models

- Model 1 – Central Place Theory
- Model 2 - Partridge et al. (2007 and 2008)
- Model 3 – Distances from each rural to each urban locality
- Model 4 – Ganning et al. (2013)

## General model

$$\% \Delta Y_{2000 \text{ y } 2010, is} = \alpha + \beta \text{DIST}_{i \rightarrow T_j} + \gamma \text{GEOG}_{i, 2000} + \delta \text{MKT}_{T_j, 2000} + \theta \Delta \text{MKT}_{T_j, 2000 \text{ y } 2010} + \sigma_s + \epsilon_{ist}$$

$Y$  = population or any welfare indicator for an RA  $i$ , in state  $s$ .

$\text{DIST}$  = travel time from RA  $i$  to the different UA Types (1 to 7)

$\text{GEOG}$  = vector of lagged  $i$  variables

$\text{MKT}$  = vector of market potential indicators for  $i$  that are related to each Type  $j$  UA in the initial period (2000)

$\Delta \text{MKT}$  = changes between 2000 and 2010

$\sigma_s$  = fixed effects for each of 32 Mexican states

$\epsilon$  = residual term

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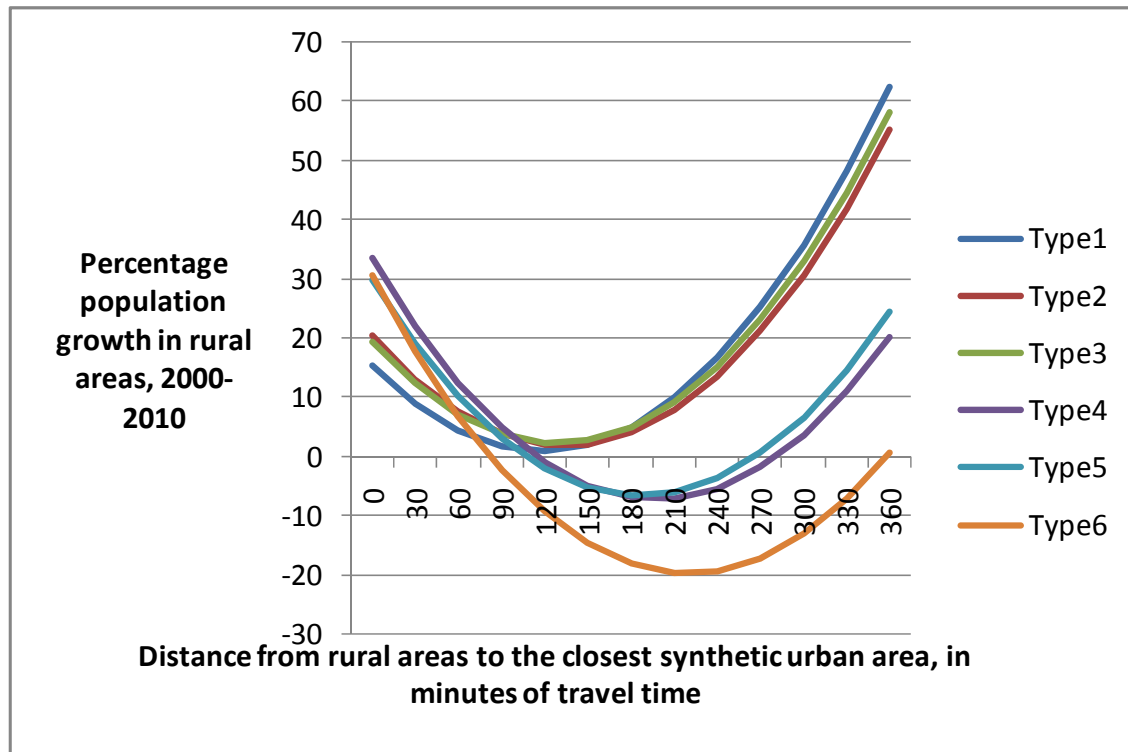
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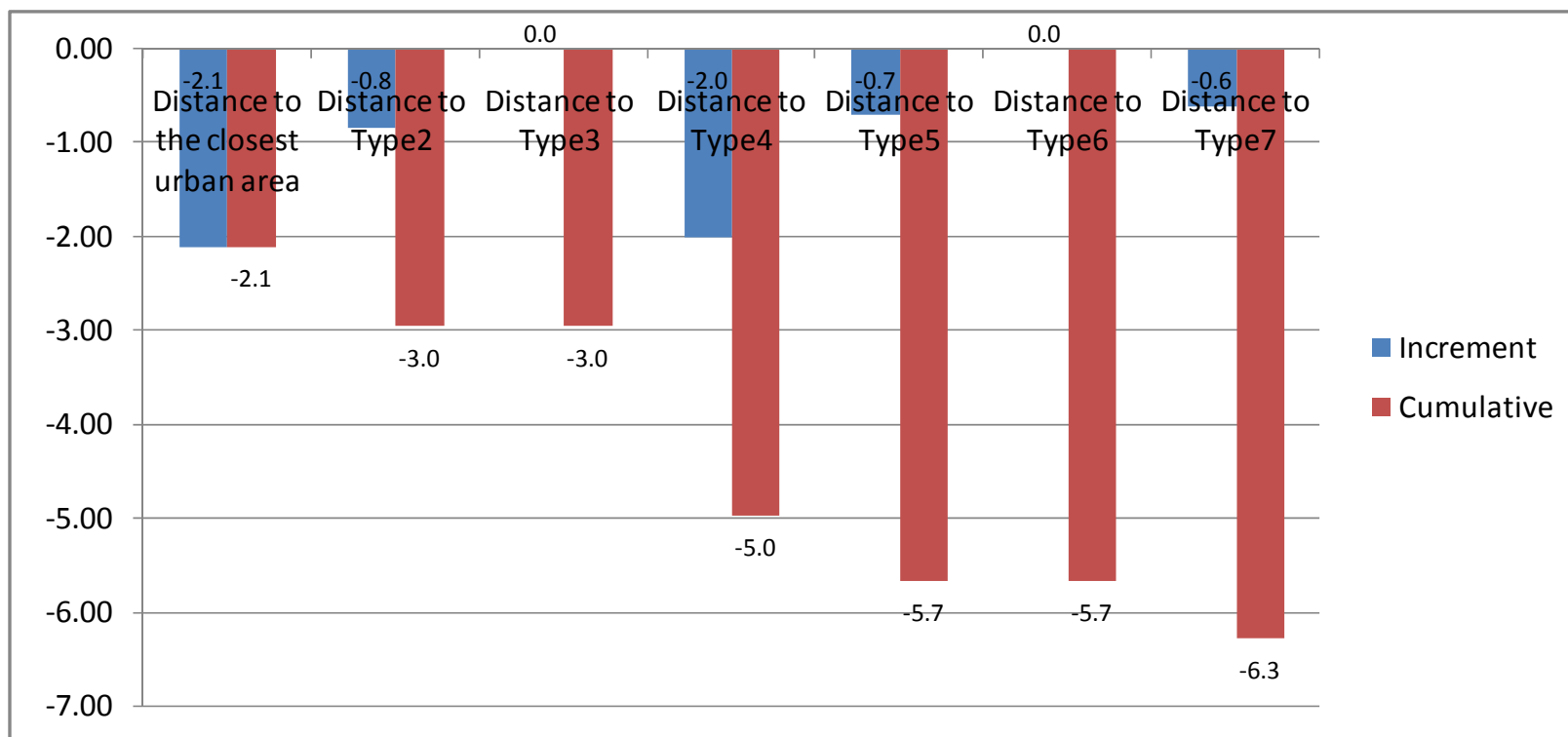
## Effect of distance to urban of different sizes on rural population growth

	Model1	Model 4
Dummy variable for Type2 urban area	1.661	5.264
	(3.10)***	(5.97)***
Dummy variable for Type3 urban area	3.511	4.171
	(3.03)***	(2.94)***
Dummy variable for Type4 urban area	13.849	18.451
	(9.84)***	(9.87)***
Dummy variable for Type5 urban area	2.577	14.677
	(2.40)**	(7.41)***
Dummy variable for Type6 urban area	10.425	15.405
	(5.86)***	(7.67)***
% population change in nearest urban area	0.253557	0.482942
	(17.54)***	(21.81)***
% per capita income change in nearest urban area	-0.05888	-0.0465
	(5.75)***	(2.99)***

# Population growth in rural areas and distances to synthetic urban areas



## Population growth in rural areas and incremental distances to higher-tier urban areas (Model 2, Partridge's)



## Effect of changes in population of cities of different sizes, on rural population growth

UA Type	Average percent change in urban population, 2000-2010	Population change in RA (Model 1). Regression coefficient 0.253 (c)	Population change in RA (Model 4). Regression coefficient 0.483 (d)
	(a)	(a)*(c)	(a)*(d)
Type 1	16.4	4.2	7.9
Type2	22.9	5.8	11.1
Type3	20.0	5.1	9.7
Type4	21.7	5.5	10.5
Type5	24.6	6.2	11.9
Type6	23.0	5.8	11.1

## Effect of changes in per capita income in cities of different sizes, on rural population growth

UA Type	Average percent change in urban per capita income, 2000-2010	Population change in RA (Model 1). Regression coefficient -0.058 (c)	Population change in RA (Model 4). Regression coefficient -0.046 (d)
	(a)	(a)*(c)	(a)*(d)
Type 1	10.6	-0.6	-0.5
Type2	7.2	-0.4	-0.3
Type3	5.3	-0.3	-0.2
Type4	-1.7	0.1	0.1
Type5	0.4	-0.0	-0.0
Type6	-11.8	0.7	0.5

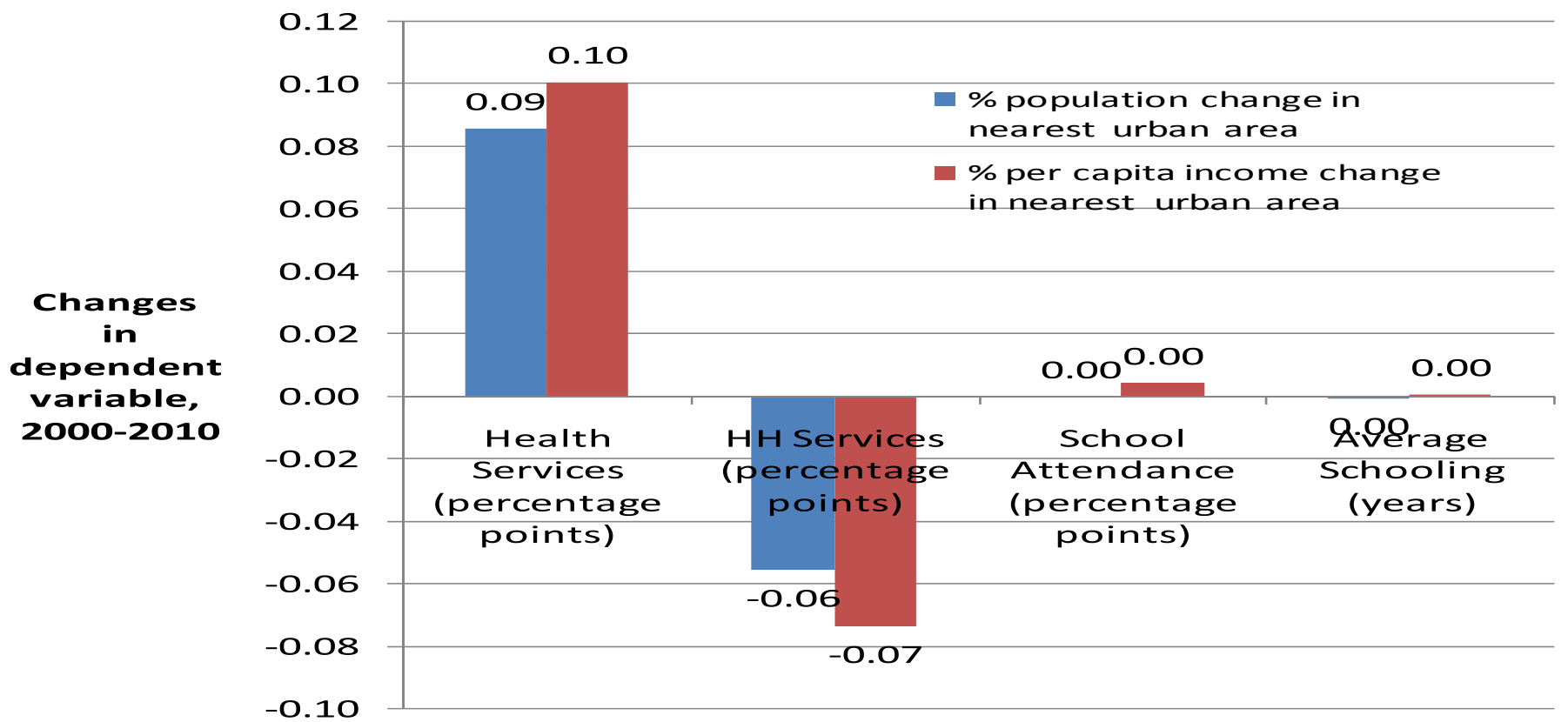
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## Effect on rural welfare indicators coming from distances to urban of different sizes

Urban area type	Households' access to quality health Services	Households' connection to Services	School Attendance	Average Schooling
Type2	-1.2	2.9	-0.4	0.0
Type3	0.0	9.1	-0.4	0.0
Type4	0.0	8.2	0.0	0.1
Type5	0.4	9.3	0.0	0.2
Type6	0.6	9.6	-0.6	0.2

## Effect of changes in urban population or per capita income, on rural welfare indicators





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## Conclusions

Mexico, 2010-2010:

1. About 33 million people (30%) live in rural-urban functional territories made up by one or more core cities <500k, and surrounding rural localities
2. Effects of proximity to all sizes of towns and cities are important and significant
3. Rural areas interact simultaneously with several cities of different sizes
4. Changes in rural population growth driven mostly by urban population growth rather than urban per capita income changes
5. Effects of cities of around 350,000 inhabitants are larger than those of smaller towns or larger cities and metro regions

## **Implications**

Rural/Urban dichotomy no longer corresponds to the contemporary socio-spatial organization of Mexico – the missing middle is very large and ignoring it could explain many policy failures

### **Necessary extension:**

Incomplete picture coming from looking at *individual rural communities* related *to individual urban centers*.

We need to do the same analysis but looking at effects of different functional territories (rural, rural-urban, and urban) relating to other functional territories

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