

Innovation and inequality

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“Not only is Silicon Valley the home of great economic wealth; it’s also one of the most innovative and creative regions in the world. If ever a rising tide of prosperity were going to lift all boats, you would expect it to happen here. Yet it doesn’t. Instead the opposite occurs.”

Florida 2005: 186

About the presentation

- ▶ **Urban, regional and national government invests in innovation**
- ▶ **Excellent evidence on innovation and urban growth**
- ▶ **Abundant research on innovation and national inequality**
- ▶ **Yet, relatively little evidence on the urban / regional distribution of gains**
- ▶ **Aim of the presentation to address this question**
 1. Looking at the EU, US, and Canada
 2. Trying to extrapolate what are the implications for emerging countries

Innovation and economic success

► Innovation seen as vital for economic success

1. European Lisbon Agenda and Europa 2020
 - Aims to generate a smart, sustainable and inclusive growth and to address continental innovation gap with US
2. United States – Strategy for American innovation
 - “The first step to winning the future is encouraging American innovation” (Obama, 2011)
3. A large number of emerging countries following this lead

But, who gains?

▶ Innovation produces (some) gains

1. Skilled workers (Echeverri-Carroll and Ayala 2009)
2. Innovative firms (Van Reenen 1996; Faggio et al. 2007)
3. Follow-up effects in local labour markets (Sassen 1996; Kaplanis 2007; Lee et al. 2013)

▶ But, effect depends on social, economic and geographical context – little urban / regional evidence

▶ Question 1: Does innovation lead to inequality in cities and regions?

▶ Question 2: In what context? How does the relationship vary continentally?

Why might innovation lead to inequality?

► Composition effect

1. Innovative workers, firms or sectors may simply pay more
2. Strong evidence linking innovation and wages (Van Reenen 1996; Faggio et al. 2007)
3. Evidence on skill premia in cities (Echeverri-Carroll and Ayala 2009)

► Innovation and dispersion

1. Not all firms gain from innovation (Coad and Rao 2008)
2. Superstar effects (Rosen 1981)
3. Lack of workplace regulation (Storper and Scott 1990)

The Model

For region or city 'i', time t

$$\text{Gini}_{it} = \alpha + \beta_1 \text{HighSkill}_{it} + \beta_2 \text{PopDen}_{it} + \beta_3 \text{Income}_{it} + \beta_4 \text{Unemp}_{it} + \beta_5 \text{Migration}_{it} + \beta_6 \text{WageCoord}_{it} + \beta_7 \text{Innovation}_{it} + v_i + \varepsilon_{it}$$

1. Where,
2. HighSkill – Share qualified to degree level
3. PopDen – Population Density
4. Income – GDP (EU) / median wage (US)
5. Unemp – Unemployment
6. Migration – Non-state residents (USA), migration balance (EU)
7. WageCord – Measure of wage coordination (Visser)
8. **Innovation** – patents per 100,000
9. Fixed effects panel data regression (clustered standard errors)

Data

▶ Europe

1. European Community Household Panel (100,000 + individuals)
2. 13 European countries
3. 93 NUTS 1 regions (UK & Portugal NUTS 2)
4. Gini Coefficient of net wages among normally working people (14 + hours per week)

▶ US

1. Current Population Survey microdata (130,000 individuals)
2. Matching with innovation data difficult: 70 cities
3. Gini coefficient of gross wages among normally working people (14 + hours per week)

Full Results: Europe

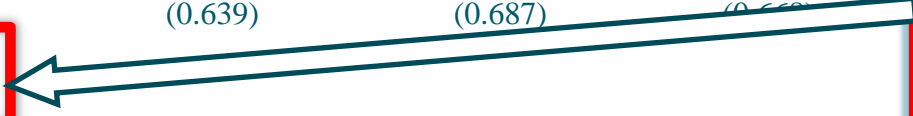
	(1)	(2)	(3)	(4)
Dependent	Gini Coefficient of Wages, 1995 - 2001			
GDP Per Capita (ln)	-0.0338*** (0.0105)	-0.0218* (0.0109)	-0.0330*** (0.0104)	-0.0261** (0.0118)
Unemployment % (ln)	-0.000746 (0.000760)	-0.000222 (0.000943)	-0.000585 (0.000823)	-0.000670 (0.000783)
Population Density (ln)	-0.00871*** (0.00126)	-0.00898*** (0.000882)	-0.00976*** (0.00107)	-0.00880*** (0.000853)
Share with Degree (ln)	0.000163 (0.000139)	0.000200 (0.000163)	0.000198 (0.000134)	0.000260 (0.000162)
Wage Coordination	-0.00788*** (0.00240)	-0.00786** (0.00268)	-0.00777*** (0.00209)	-0.00734*** (0.00221)
Migration balance	-0.364 (0.631)	-0.350 (0.639)	-0.339 (0.687)	-0.277 (0.668)
Patents per 100k (ln)	0.00430** (0.00148)			
Biotech patents. (ln)		0.00206 (0.00240)		
ICT patents p.c. (ln)			0.00437*** (0.00124)	
HT patents p.c. (ln)				0.002 (0.00177)
Constant	0.660*** (0.102)	0.551*** (0.110)	0.654*** (0.106)	0.590*** (0.119)
Observations	490	428	459	458
R-squared	0.025	0.018	0.026	0.018
Number of cases	86	83	85	85

Innovation increases inequality in European regions

Mostly linked to ICT

0.00430**
(0.00148)

0.00437***
(0.00124)



Standard errors in parenthesis. Estimated with fixed effects. Robust standard errors clustered by country. *** p<0.01, ** p<0.05, * p<0.1

Full Results: United States

	(1)	(2)	(3)
Dependent Variable	Gini Coefficient of Wages, 1996 - 2009		
Median Wage (ln)	-2.77e-06* (1.34e-06)	-3.25e-06* (1.51e-06)	-2.84e-06* (1.30e-06)
Unemployment % (ln)	0.00423*** (0.00113)	0.00484* (0.00226)	0.00421** (0.00138)
Population Density (ln)	0.526** (0.205)	0.692*** (0.168)	0.505** (0.189)
Degree, % (ln)	0.00248*** (0.000654)	0.00130 (0.00199)	0.00185** (0.000637)
Recent Migrants (%)	0.121 (0.239)	0.0988 (0.188)	0.0717 (0.218)
Patents per capita (ln)	-0.000321 (0.0148)		
Biotech patent p.c. (ln)		0.0202* (0.00909)	
ICT patents p.c. (ln)			0.0125** (0.00536)
Constant	-1.417 (0.824)	-1.786*** (0.524)	-1.197 (0.686)
Observations	471	362	439
R-squared	0.065	0.108	0.067
Number of cps_code	69	59	65

No overall link between innovation and inequality in the US

Although innovation in some sectors may be associated with increases in inequality within cities

Standard errors in parenthesis. Estimated with fixed effects. Robust standard errors clustered by country.

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

Full Results: Canada

TABLE 4. FIXED-EFFECTS REGRESSION RESULTS – BASELINE ESTIMATES

<i>Independent variables</i>	<i>Gini coefficient</i>			<i>Theil index</i>		
	(1)	(2)	(3)	(4)	(5)	(6)
Innovation	.003** (.015)	.003** (.001)	.003** (.001)	.007** (.003)	.007** (.003)	.008** (.003)
City size	.045** (.022)	.066** (.027)	.015 (.023)	.183** (.067)	.166** (.072)	.052 (.058)
<i>Economic</i>						
Manufacturing (%)		-.144** (.045)	-.184** (.049)		-.105 (.104)	-.220* (.132)
Government (%)		-.218** (.080)	-.208** (.084)		-.430** (.203)	-.468** (.226)
Economic development		-.001* (.001)	-.001 (.001)		.001 (.001)	.001 (.001)
Unemployment rate		.179 (.117)	.052 (.142)		.737** (.294)	.282 (.383)
<i>Socio-demographic</i>						
Female participation (%)			-.091 (.109)			-.273 (.228)
Visible minority (%)			.278** (.068)			.792** (.228)
Young (%)			-.019 (.040)			.043 (.118)
Senior (%)			-.020 (.051)			-.016 (.160)
Education ratio			.118* (.065)			.238 (.197)
<i>Institutional</i>						
Unionization (%)			-.216 (.185)			-.329 (.733)
Minimum wage			.003 (.005)			.010 (.019)
2001 dummy	-.004** (.002)	-.002 (.002)	-.010* (.006)	-.001 (.004)	.006 (.006)	-.012 (.023)
2006 dummy	.009** (.002)	.010** (.003)	-.006 (.014)	.022** (.004)	.032** (.009)	-.009 (.054)
Constant	-.167 (.256)	-.328 (.295)	.308 (.317)	-1.89** (.772)	-1.71** (.800)	-.145 (.860)
# of obs.	244	244	244	244	244	244
# of cities	85	85	85	85	85	85
R ²	.403	.472	.575	.352	.379	.478

Note: Robust standard errors are shown in parentheses; * and ** indicate significance at the .10 and .05 levels, respectively.

Innovation leads to rising inequality in 85 Canadian cities

Breau, Kogler and Bolton (2014)

Overview of results

- ▶ **Overall innovation drives inequality in EU regions and in Canadian cities**
- ▶ **But not in US cities**
- ▶ **Potential reasons:**
 1. Planning
 2. Labour market institutions
 3. Migration patterns
 4. But ultimately complex set of place-based factors
- ▶ **Hints at two effects:**
 1. **Growth effect** – growth reduces inequality (Wheeler 2004a; Glaeser et al. 2009)
 2. **Innovation effect** – innovation increases inequality

Implications for emerging countries

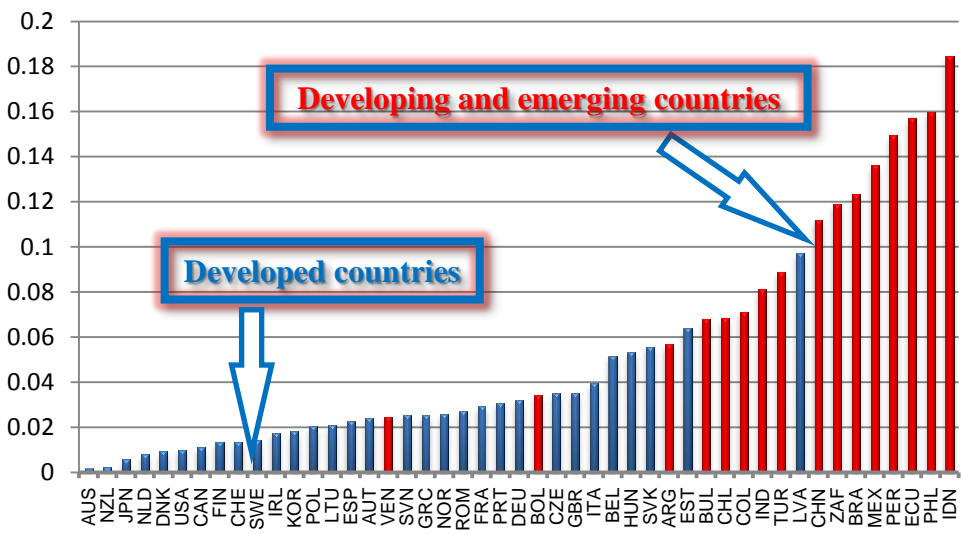
► Positive message:

1. Innovation leads to greater growth
2. But not necessarily to greater inequality
3. Whether innovation drives inequality is place specific

► But word of warning: innovation may lead to greater risks of polarisation in the emerging world

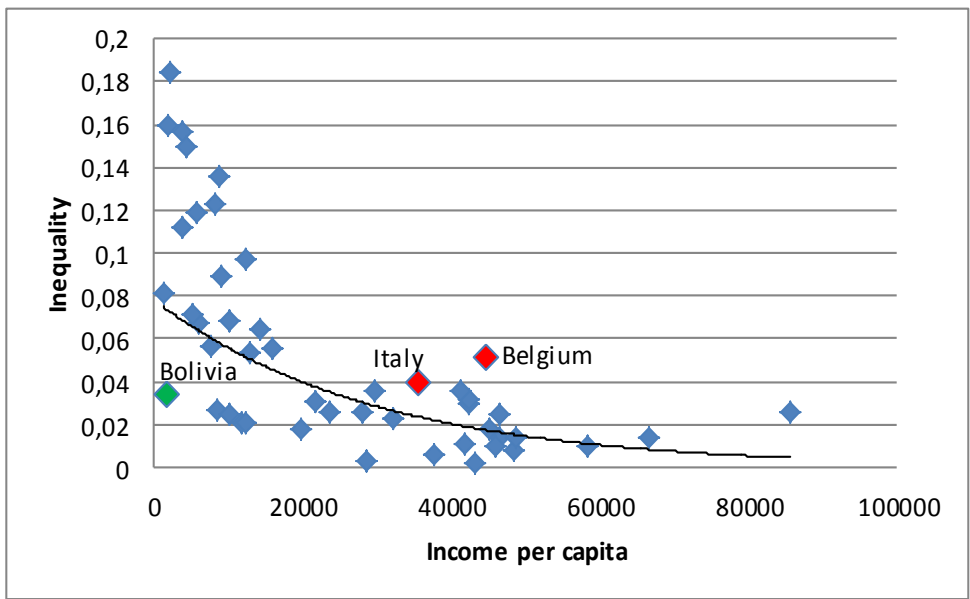
1. Countries at an earlier stage in the innovation process
2. Generally with more polarised urban and regional systems
3. With significantly greater levels of inequality
 - Interpersonal
 - Interterritorial

Inequalities in emerging countries



- ▶ Much greater internal territorial inequalities
- ▶ Internal disparities much larger in developing and some emerging countries (Brazil, Chile, China, India, Indonesia, Mexico)

- ▶ Poorest countries at greatest risk of inequality
- ▶ Some exceptions, Bolivia, Italy or Belgium



Conclusions

- ▶ **Innovation leads to growth and can be inclusive (the ‘tide that lifts all boats’)**
- ▶ **But it can also lead to greater interpersonal (and territorial) inequality**
- ▶ **Which effect prevails depends on local conditions**
- ▶ **Innovation needs to be monitored**
- ▶ **And, especially, in emerging countries, as they are most at risk of suffering the economic, social, and political effects of greater polarisation**

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