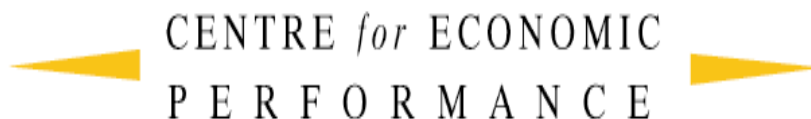


# DISCUSSION OF “INNOVATION & TOP INCOME INEQUALITY” BY AGHION, AKCIGIT, BERGEAUD, BLUNDELL & HEMOUS

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# A TOUR DE FORCE!

- Tackles a major economic & policy question of our age: rise of “extreme inequality”
- Brings interesting framework of Schumpeterian growth theory to understand this phenomenon
- Rich data & econometrics (impressive # of robustness tests) to show that **innovation seems to be an important causal reason for growth of top income inequality**
- A really seminal contribution

# BIG PICTURE

- Big increase in the share of the top 1% in total income in US and most other major economies
  - Raises issues of Equity, but also of Efficiency.
- **“Rents”** view of the top 1%
  - Corporate Governance failures (CEO); Financial Sector & “Too Big to Fail” problems; Lowering of top taxes; union decline; Changing norms; etc.
- **Innovation** view of the top 1%
  - Increase in innovation (especially by entrants) gives temporary rents to entrepreneurs & complementary occupations
- Policy implications different. Very high rates of tax on top 1% has trade-offs: could harm innovation & growth

# KEY EMPIRICAL FINDING

- In US cross-state panel data
- **States which increased innovation by most had largest increase in income share of the top 1%**
  - Looks Causal: Two different Instrumental Variables based on (i) spillovers & (ii) politics
  - Innovation doesn't change inequality below the top 1%
  - Is temporary (Schumpeterian rents?)
  - Impact of innovation on inequality is weaker when there is more lobbying
  - (In cross section) innovation is associated with more social mobility
- **A few issues: (i) Story; (ii) Empirics; (iii) Theory**

## **(i) BASIC QUESTION ON STORY**

- Has there really been an explosion of innovation (as opposed to patents) since 1980?
- Patent explosion is likely to be (at least partially) due to laxer standards in USPTO and pro-patent court decisions
- If innovation explosion why don't we see this in TFP growth etc.? TFP growth slower 1980-2010 than 1950-1980

## (ii) EMPIRICS 1: TRANSPARENCY

- **“Bad Control” issue?** Many potentially endogenous variables on right hand side. These sometimes strangely signed & significance/signs varies across specifications
  - e.g. GDP/capita negatively correlated with top income share (opposite for output gap).
  - I’d like to see some analysis of innovation on GDP growth directly to see if lines up with theory
- Paper mentions that results robust to specification with just state & year dummies (p.22). Hence, should be able to see relationship in a simple scatterplot
  - e.g. nice to see results in a long difference graph,
- Would help to allay concerns that results depends on conditioning on specific covariates

# EMPIRICS 2: INSTRUMENTS

- Spillovers IV

- Use spillovers between states. Lagged innovation in other states weighted by “closeness” using lagged cross state citation frequency
- *Neat idea* – I’d like to see first stage & also impact on productivity a la Bloom, Schankerman & Van Reenen (2013, Econometrica)
- Why is IV excludable from 2<sup>nd</sup> stage? p.22 says spillovers have direct effect on inequality rather than simply via innovation in own state
  - Hence, reduced form of inequality on spillovers interesting, but not an IV in classical sense
- I liked the **appropriations committee** as an IV better, but not enough description

# EMPIRICS 3: OUTLIERS

- More graphical analysis to help to allay concerns that some outliers driving results.
- Specification uses state fixed effects so variation is annual shocks
- Annual innovation rates (& inequality) can be volatile, especially as you're using logs & have some small states
- Show long-differenced specifications; look at using initial size of state as weights; robustness to non-logged specifications; leverage statistics; some more graphical analysis, etc.



### **(iii) LINK WITH THEORY**

- Theory relates to Schumpeterian growth model with incumbents & entrants in imperfectly competitive industries
- But data is cross state. Most high tech industries operate in international (or at least national markets). Examples: Pharma, computer hardware, medical instruments, software
- So unclear (to me) why innovation in a state should affect inequality in a state via state-specific market structure
  - E.g. lobbying by high tech not really about state specific barriers to entry, but more nationwide (tariffs, anti-dumping , etc.)

# CONCLUSIONS

- A really fantastic paper – first real attempt to directly link innovation with extreme income inequality in a compelling way
- Required reading – will definitely be on my grad students reading list!

# **BACK UP: MORE MINOR ISSUES FOR AUTHORS ONLY**

## OTHER ISSUES

- *Dynamics.* You should include a distributed lag & look at impulse response (as in Van Reenen, 1996, QJE). The long-run effect of innovation on top wage should still be positive even though it fades away.
- *Lack of impact of innovation on anything below top 1% is surprising.* Many papers in literature find an effect of innovation (R&D, patents) on skill demand below top 1%. E.g. Berman, Bound & Machin (1998, QJE); Machin & Van Reenen (1998, QJE), Autor, Katz & Krueger (1998). See Bond & Van Reenen (2007 Handbook of Econometrics survey).
- Figure 1. Show citations per capita as this is what you do in Fig 2 & where you get your econometric results from
- Fig 2 – States with biggest increases in inequality & innovation look odd: Idaho, Washington, Oregon, Utah, Wyoming? Makes me think that the log differences may be funny because of low values. What about levels not logs?

# OTHER ISSUES

- Bakija (2012) not in references
- You should be clear that you're arguing that increase in patents/citations in Fig 1 is a real exogenous acceleration in technology post 1980. But:
  - Some of patent explosion is purely institutional (Jaffe-Lerner book on how USPTO allowing rubbish patents; change in Appeal Court as mentioned in Lerner & Kortum that you cite)
  - If there has been an explosion in innovation why is productivity growth slower 1980-2010 than 1960-80?
- Top of p.3. It's not obvious to me that the hedge fund managers, lawyers, & retail CEOs are complements to the innovation we're talking about here
- Slides 5-6. Since this is just showing that all the variables are trending up since 1980, not very informative.

# OTHER ISSUES

- P. 16 how is “entrepreneurial income” defined? Looks high to me if this is just self-employed profits. And what else is in the residual after wages and this item?
- P.16 the fact that inequality very high in Connecticut illustrates the problem I mentioned over “link with theory”. This is because rich people working in NY live in low income tax Connecticut & nothing to do with innovation in Connecticut
- Para above 3.3: give correlation numbers
- Since there are so many ways to calculate output gap why not simpler measure of unemployment or employment rate to capture local business cycle?
- Footnote 21. I recall in our EJ & ReStud paper we simply used count data models which avoided having to do this as we could treat the zeros as zeros

# OTHER ISSUES

- **Standard Errors.** I would have expected some longer memory autocorrelation in this data so I'm surprised newey(2) is sufficient. I think you should present a test and show robustness to longer memory serial correlation
- You also have some complex issues with spatial correlation, especially when you start using the cross state Ivs. Conley standard errors, etc.?
- At various points you mention the significance of other variables (like students per capita on p.22; natural resources in col (5) p. 58). If these matter why aren't they in baseline specification. You include many other insignificant variables after all.
- At many points I was itching to see the reduced for inequality on the IVs. These are of interest even if one doesn't believe the exclusion restriction
- What about using the two IVs together & doing an over-identification test?

## OTHER ISSUES

- P.29 Does South Dakota really have a big financial sector?
- P.31 I find it surprising that neither California or Massachusetts have fast growth of innovation or inequality. It makes me wonder about whether the functional form is getting you some counter-intuitive results
- P. 35 For entrant innovation, is it really the individual level that you want for this? I would have thought you would want to look at firms. Group by assignees & see if innovation is coming from firms who haven't patented before
- **Lobbying.** I wonder if this simply reflects that there are some states which have declining industries (who intensively lobby for protection from China, etc.) who have slow growth in innovation and top 1%
- P. 38 you mention some cross country work but don't reference. I'd expand, reference or drop



# OTHER ISSUES

- Table 2
  - Interesting that raw patents are insignificant
  - Seems like only significant variables are GDP per capita and output gap
  - By population growth do you mean level of population or its change?
- Table 3
  - Odd that share of finance was insignificant in Table 2 then comes to life in this table (funny it wasn't before). Presumably this is because of changing sample. Suggests some heterogeneity of coefficient by sample period.
  - You should report “spatial correlation” coefficient & SE (its also confusing because I thought you were using Conley SEs or something)

# OTHER ISSUES

- Table 4
  - Weird that government size is positive and significant in col (5), negative and significant in col (6)-(7) and insignificant in other columns?