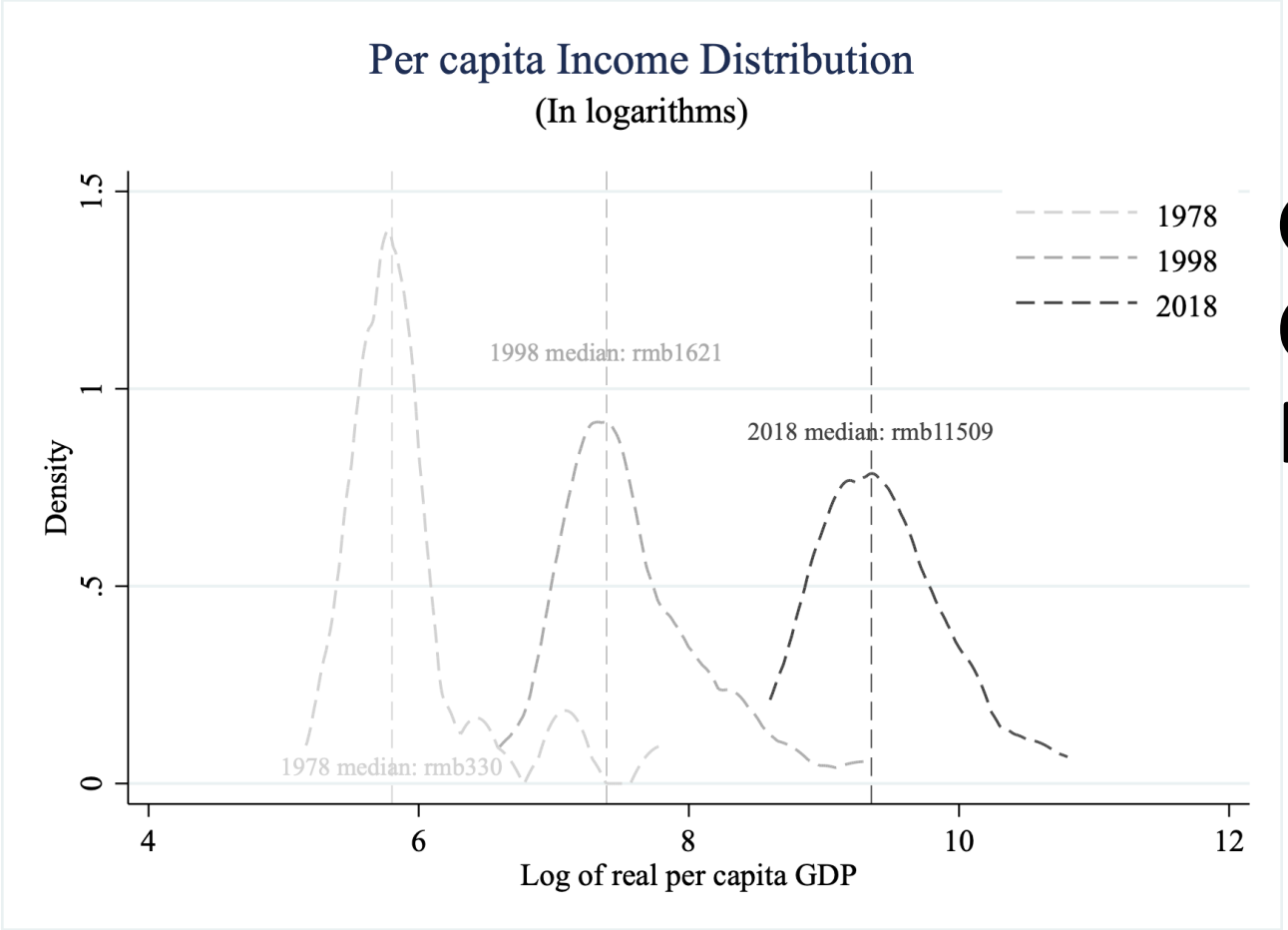

Growth through Heterogenous Convergence in Chinese Provinces

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Common prosperity

- Common prosperity has been an underlying tenet of Chinese development since the economic reform in 1978.
- “Let some regions and some people grow rich first, then help other regions gradually achieve common prosperity.”
- Convergence: does the growth of China (tides) lift the provinces (boats)?

Tension on measuring convergence

- Sigma, beta convergence assumes economies converge to the same thing

- But another says no, conditional convergence which allowed for Solow fundamentals (Mankiw, Romer and Weil, 1992; Jones, 2016), fixed effects (Acemoglu et. al, 2019, 2021)

- Kremer, Willis and You (2021) find absolute convergence since the late 1980s, but Acemoglu and Molina (2021) argue conditional convergence.

There is also a question on the differences in convergence speed

1. We compare the convergence coefficient across the pooled (KWY), fixed effects (AM) and heterogenous panel estimates.

2. Convergence in income (real GDP per capita) in 31 mainland Chinese provinces, 1978 – 2018
   - A good test bed, for all their heterogeneity (geography, history, culture, policies etc.), it's one country, so we expect to find common and faster convergence (Lucas, 1990)

Contribution 1: the convergence debate

- AM argues that pooled estimators are biased toward zero in the absence of fixed effects, but the fixed effects estimator is also biased against the heterogeneous estimates.

- Heterogeneous convergence allows some to converge and others not to converge rather than assuming that they all must converge at the same rate or all not converge.

- insights into income inequality across provinces vs. homogeneous approaches

Contribution 2: We differ from the convergence literature in Chinese provinces in two aspects

1. We use heterogenous convergence that allows both steady-state and the transition towards steady state to differ across provinces.

2. We model a common factor in both the long and short run of the convergence model. Pairwise convergence.

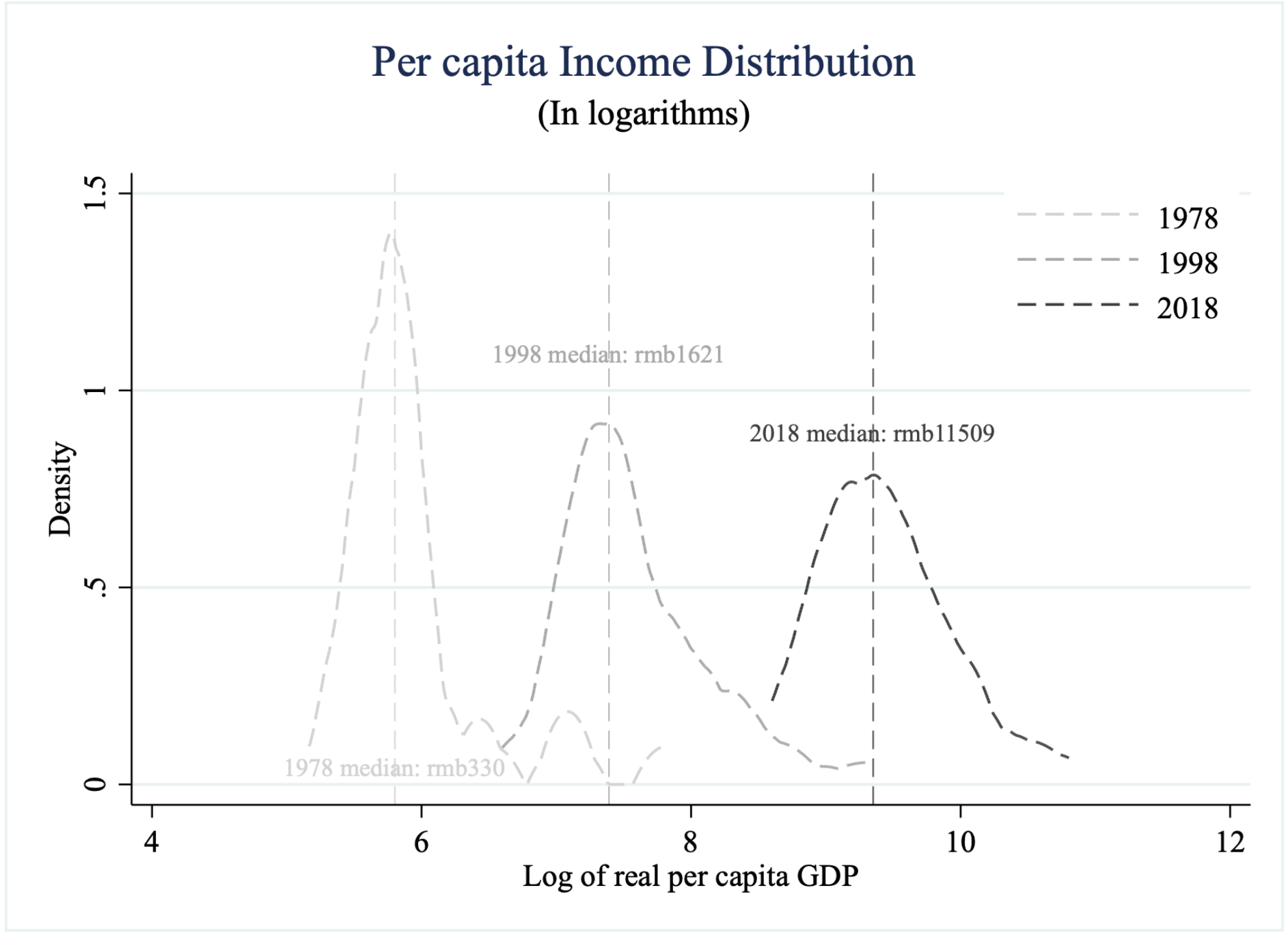
- The tides (growth of China) lift the boats (provinces). But heterogeneity to the tide is also a salience – two opposing forces of income inequality.

31 Chinese provinces

- Mainland China is made up of 31 administrative provinces. The literature has grouped provinces by regions in studying convergence and income inequality in China (Zhang, 2021)

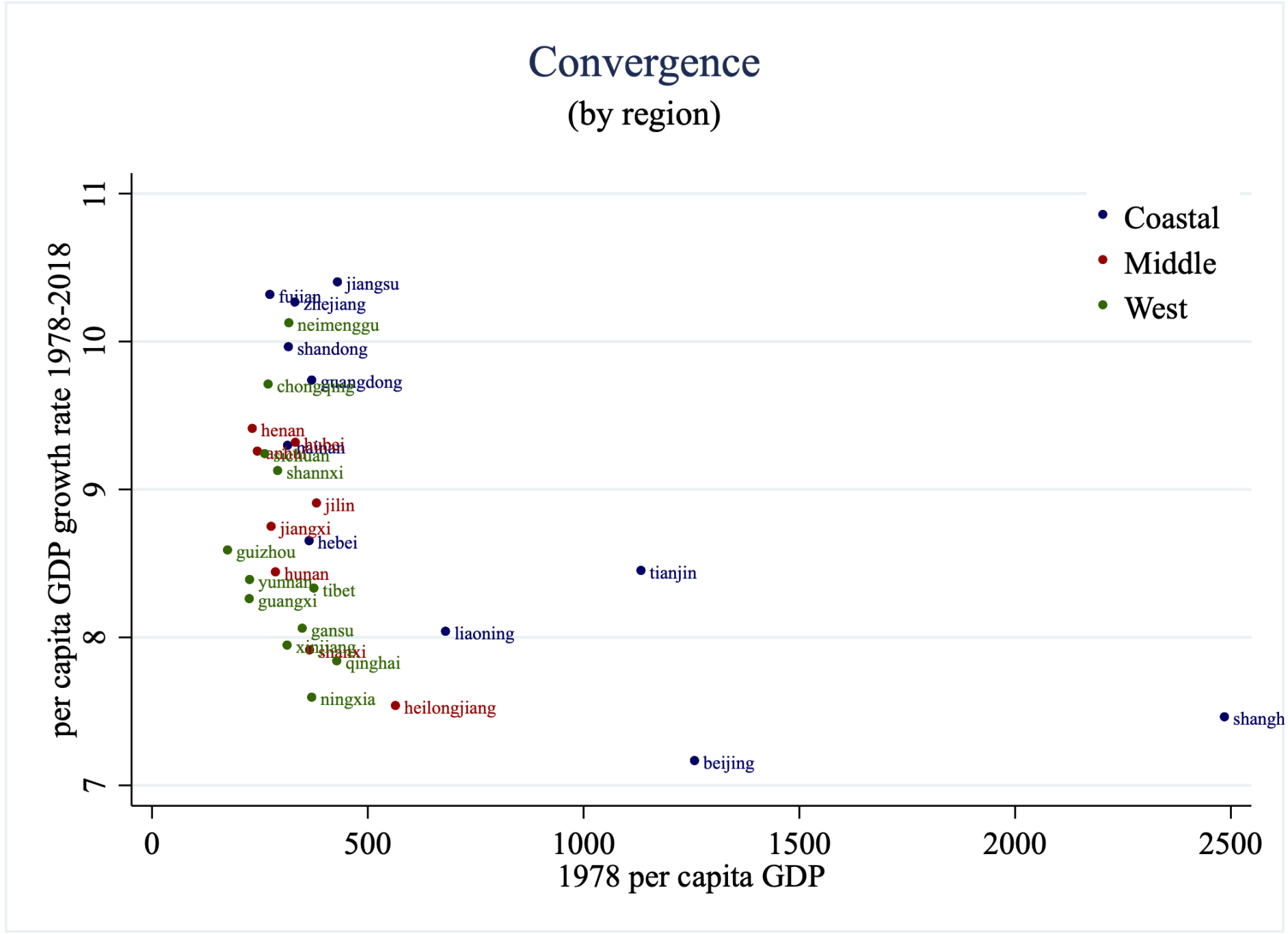
- the EPS China Statistics database (NBS), 1978-2018

- Coastal (11): Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan, Liaoning
- Middle (8): Shanxi, Anhui, Jiangxi, Henan, Hubei, Hunan, Jilin, Heilongjiang
- West (12): Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang


Per capita Income Distribution
(In logarithms)
Density
0
.5
1
1.5
4
6
8
10
12
Log of real per capita GDP
1978
1998
2018
1998 median: rmb1621
2018 median: rmb11509
1978 median: rmb330

Principal components

	Log of Real GDP per Capita		Log Difference of Real GDP per Capita	
	Cumulative explained variation (%)	Classification	Cumulative explained variation (%)	Classification
Principal component 1	99.5	China	50.3	China
Principal component 2	99.8	Regional	61.2	Regional
Principal component 3	99.9	Regional	68.5	Regional
Principal component 4	100	Regional	74.5	Regional


Convergence
(by region)
per capita GDP growth rate 1978-2018
11
10
9
8
7
0
500
1000
1500
2000
2500
1978 per capita GDP
Coastal
Middle
West
jiangsu
fujian
zhejiang
neimenggu
shandong
guangdong
chongqing
henan
hubei
anhui
sichuan
shannxi
jilin
jiangxi
hebei
guizhou
hunan
yunnan
tibet
guangxi
gansu
liaoning
xinjiang
shanxi
qinghai
ningxia
heilongjiang
tianjin
shangh
beijing

Set out the models

- Pooled OLS estimators (Kremer et. al, 2021)

$$\Delta y_{it} = a y_{it-1} + d + \varepsilon_{it} \quad (1)$$

- Growth diffusion model (Pesaran, 2006)

$$\Delta y_{it} = a y_{it-1} + b \bar{y}_{t-1} + c \Delta \bar{y}_t + d + \varepsilon_{it} \quad (2)$$

- Fixed effects (Acemoglu and Molina, 2021)

$$\Delta y_{it} = a y_{it-1} + b \bar{y}_{t-1} + c \Delta \bar{y}_t + d_i + u_{it} \quad (3)$$

- Heterogeneous panel

$$\Delta y_{it} = a_i y_{it-1} + b_i \bar{y}_{t-1} + c_i \Delta \bar{y}_t + d_i + \nu_{it} \quad (4)$$

Heterogeneous convergence

- The long run of the model ($\Delta y_{it} = \Delta \bar{y}_t = 0$)

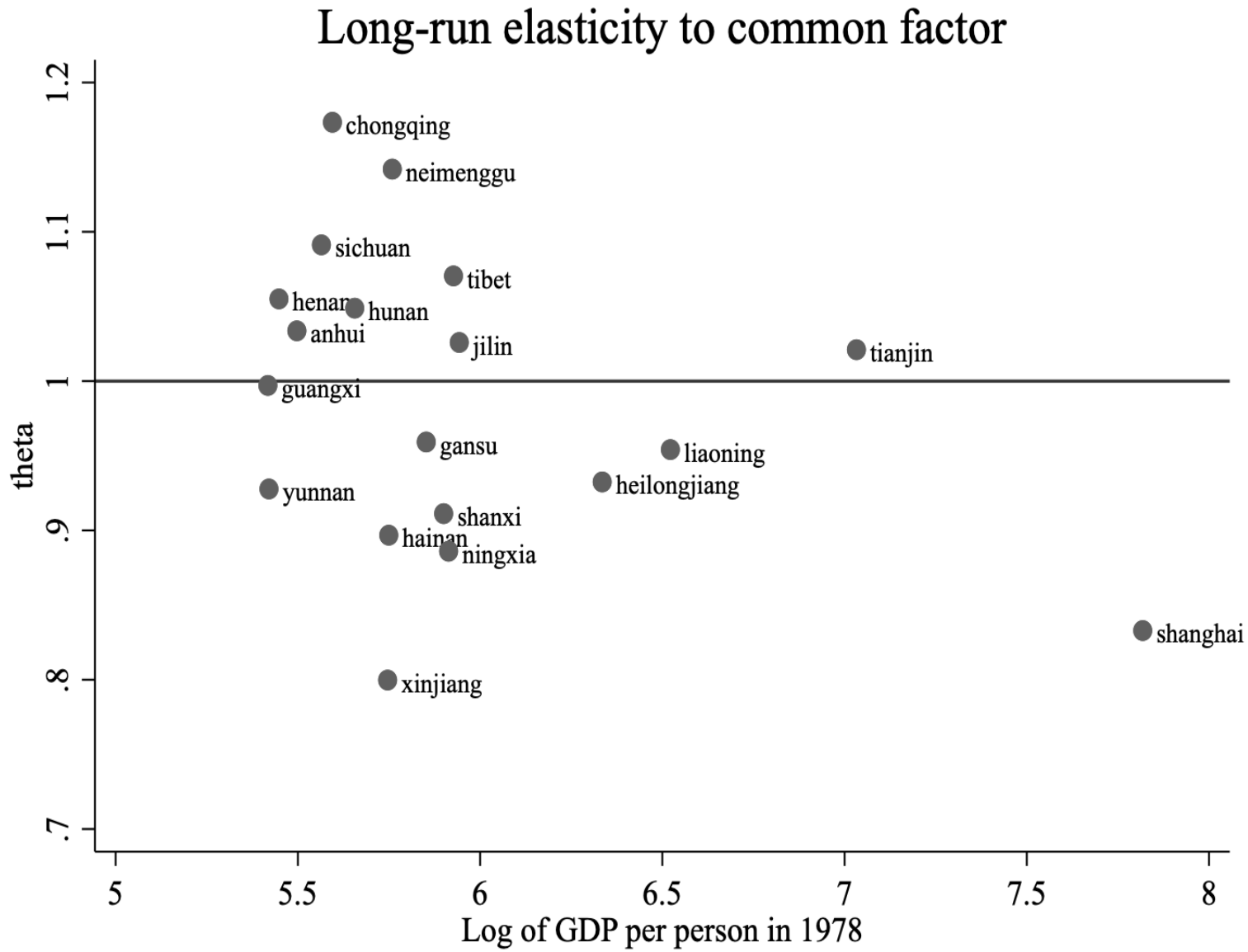
$$y_i = -(\frac{d_i}{a_i} + \frac{b_i}{a_i}\bar{y}) \tag{5}$$

- Spill-overs drive the convergence in the long-run. “A rising tide lifts the boats.”

- $\frac{b_i}{a_i}$, the long-run elasticity to the common factor.

Pooled vs. Fixed effects vs. Heterogeneous panel estimators

Dependent variable: Annual growth of real GDP per capita				
	(1)	(2)	(3)	(4)
	Pooled OLS	Pooled OLS	Prov. Eff	Mean group
	All	All	All	All
Lag income	-0.001	-0.004***	-0.041***	-0.136***
	(0.001)	(0.001)	(0.006)	(0.036)
Lag com		0.003*	0.040***	0.135***
		(0.002)	(0.006)	(0.037)
L.r. elas. com		0.79	0.99	1.02
Annual com		0.833***	0.862***	0.871***
		(0.034)	(0.032)	(0.042)


Long-run elasticity to common factor
theta
1.2
1.1
1
.9
.8
.7
chongqing
neimenggu
sichuan
tibet
henan
hunan
anhui
jilin
tianjin
guangxi
gansu
liaoning
heilongjiang
yunnan
shanxi
hainan
ningxia
shanghai
xinjiang
5
5.5
6
6.5
7
7.5
8
Log of GDP per person in 1978

Conclusion

- Whether China pulls 31 provinces as it converges to the incomes of advanced economies matters
  - “achieving common prosperity is not only an economic issue, but also a significant political issue,” said President Xi in Jan 2021 and the WEF 2022.

- Because there is no agreement on measuring convergence, we estimate convergence using pooled, fixed effects and heterogeneous panel approaches.

- In the Chinese provinces, we find strong evidence of converging to the common factor. This fact, combined with the heterogenous estimates, tells the narrative that the gap between most provinces and the frontier narrows, and despite the unevenness of growth across provinces, there is progress.

Conclusion

- We also find evidence of growth diffusing to provinces from the technological frontier, albeit slower than growth diffusing from China.

- Future research – 1. the institutions that facilitate diffusion 2. common factor is a coarse model relative to a more granular model

Thank you

Many thanks to Ron Smith (Birkbeck, University of London) who brings the NBER paper to our attention and advises this paper

- Acemoglu, D., Molina, C.A., 2021. Comment on “Converging to Convergence,” in: NBER Macroeconomics Annual 2021, Volume 36. University of Chicago Press. https://doi.org/10.2139/ssrn.3880225
- Discussion, 2022. . NBER Macroecon. Annu. 36, 443–444. https://doi.org/10.1086/718675
- Kremer, M., Willis, J., You, Y., 2021. Converging to Convergence, in: NBER Macroeconomics Annual 2021, Volume 36. University of Chicago Press. https://doi.org/10.2139/ssrn.3965119
- Pande, R., Enevoldsen, N., 2022. Comment. NBER Macroecon. Annu. 36, 413–424. https://doi.org/10.1086/718673

- Working paper available upon request: kian-howe.ong@nottingham.edu.cn

China vs. global story of convergence

- Deaton (2013) surmises globally that despite progress it has been uneven. The China story is despite unevenness there is progress.

- Opposing forces of income gap: catching up to the frontier narrows it, provinces growing at different rates widens it.

Discussion

- Finding 1: even without homogeneous vs. heterogeneous
  - A major factor driving convergence is not only the speed, but as China grows by 1%, each province would grow by 0.80%, the cyclical component and 1% in the long run.

- Finding 2: convergence as the parameter of interest
  - with the pooled estimators, provinces do not converge when we exclude common trends but converge at an annual rate of 0.4% when included.
  - with province effects, provinces converge faster at an annual rate of 4%, confirming the bias towards zero without fixed effects.
  - with heterogeneous convergence, provinces converge even faster, 13%, on average, confirming the homogeneity bias.

Brief related literature

- general convergence literature
  - Kremer, Willis and Young (2021), Acemoglu and Molina (2021), Johnson and Papageorgiou (2020), Acemoglu et. al (JPE, 2019)
  - Barro (QJE, 1991), Barro and Sala-i-Martin (JPE, 1992)
  - Pande and Enevoldsen (2021): *cross-country* to *within-country* convergence

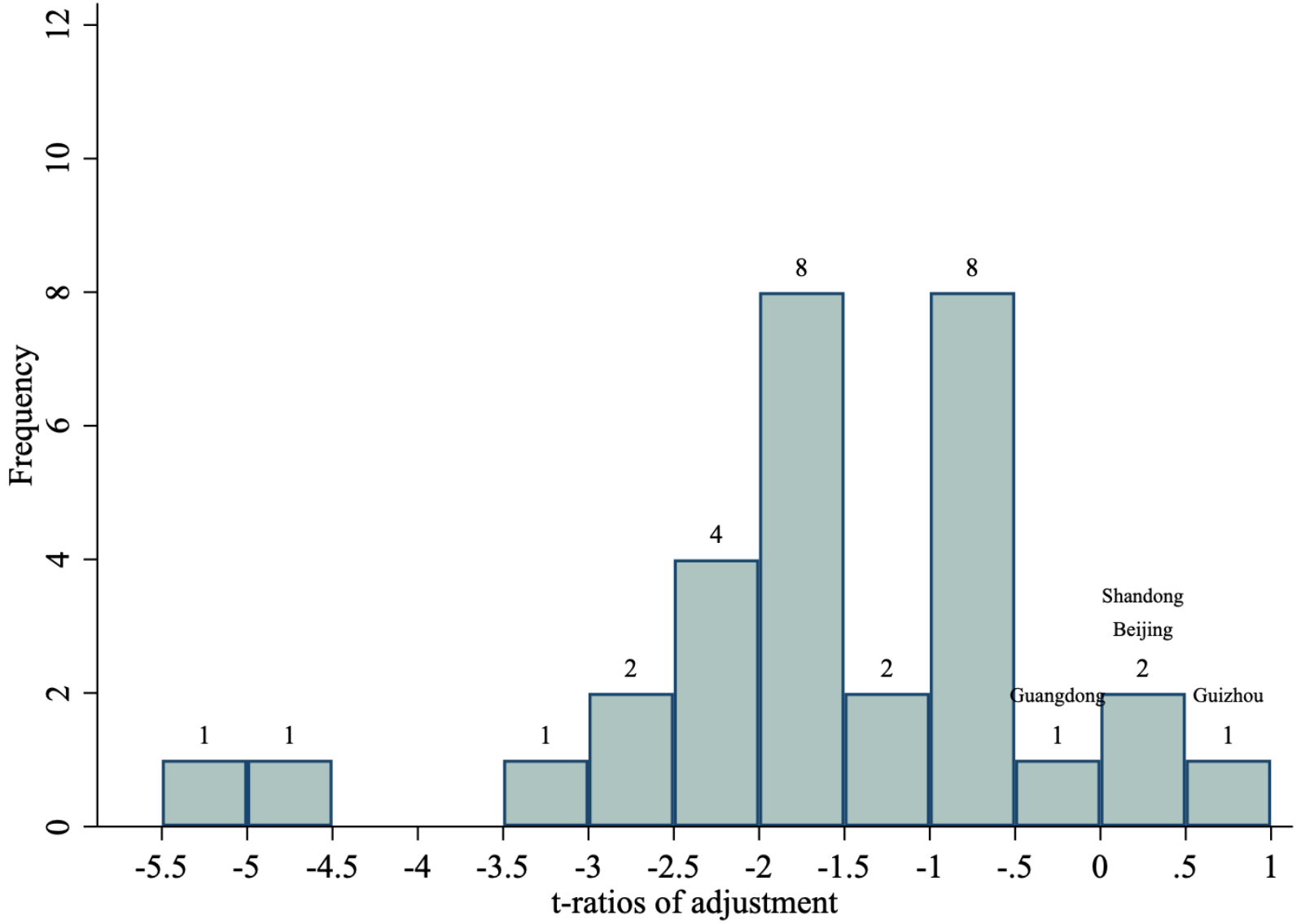
- pairwise and heterogeneous convergence
  - Pesaran (2007), Lee, Pesaran and Smith (1997, 1998), Weeks and Yao (2003)

- Chinese convergence and inequality
  - Zhang (2021), Luintel et. al (2020), Herrerías and Ordóñez (2013), Tian et. al (2016), Maasoumi and Wang (2008)

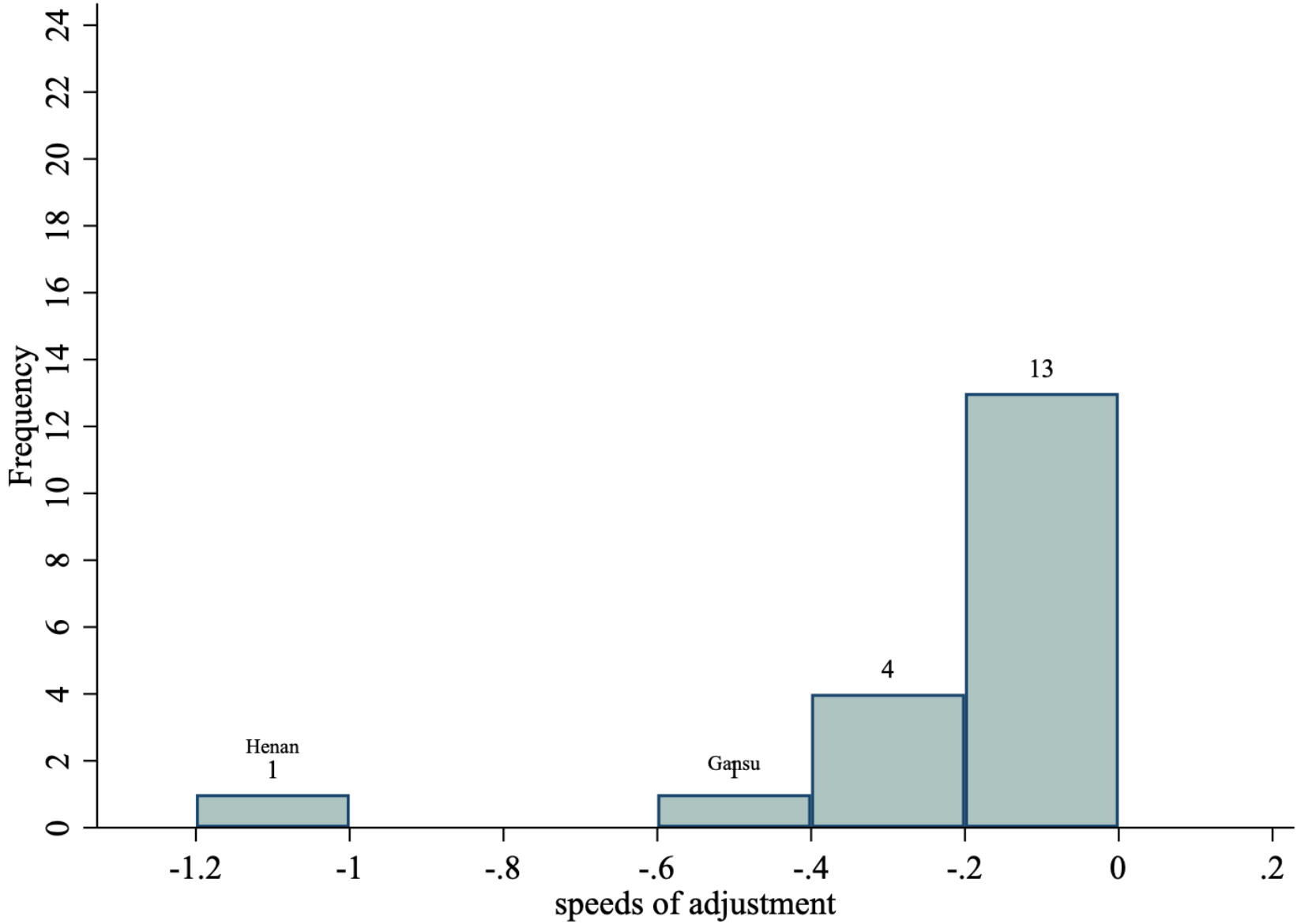
Outline of rest of presentation

1. Data
2. Model
3. Empirical results
4. Discussion and conclusions

Do some provinces converge and some do not?



Which provinces are adjusting fastest to their own steady states?



One way of putting the paper in context: Population (in millions) in 2018

	Provinces			Provinces	
1	Guangdong	112.57	17	Heilongjiang	37.81
2	Shandong	100.27	18	Shanxi	37.10
3	Henan	95.82	19	Guizhou	35.90
4	Sichuan	83.22	20	Chongqing	30.88
5	Jiangsu	80.40	21	Jilin	27.11
6	Hebei	75.38	22	Gansu	26.31
7	Hunan	68.79	23	Inner mongolia	25.31
8	Anhui	62.89	24	Xinjiang	24.66
9	Hubei	59.10	25	Shanghai	24.21
10	Zhejiang	56.97	26	Beijing	21.62
11	Guangxi	49.06	27	Tianjin	15.58
12	Yunnan	48.15	28	Hainan	9.30
13	Jiangxi	46.35	29	Ningxia	6.85
14	Liaoning	43.64	30	Qinghai	6.01
15	Fujian	39.26	31	Tibet	3.40
16	Shannxi	38.50			

The convergence debate

Case for FE vs. KWY	Case against FE vs. KWY
KWY estimator of convergence biased against FE estimator. More plausible (permanent differences across economies)	Nearly time-invariant variables drop out or become insignificant (using within-unit variations to estimate convergence). Thus, Barro is stuck for not putting in the fixed effects.

Case for heterogeneous panel vs. FE	Case against heterogeneous panel vs. FE
FE estimator of convergence biased against heterogeneous panel estimator. If the parameter of interest is the speed of convergence. FE means all economies converge at the same speed. FE means the same long-run elasticities to the common factor, but SS is different.	Less efficient. Silly estimates. Tests on convergence coefficients have low power (unit root null vs. stationary alternatives)

Discussion

- All but two provinces converge, so there is evidence of convergence (given the long-run, spill-overs aid convergence)
  - Insignificant for Beijing's coeff, positive lag income but negative lag average so sensible long-run for Guizhou, possibly high covariance (Baltagi et. al, 2003, 2008)

- Speed of convergence is like the speed of learning; 'open' provinces learn fast.
  - It is easier to copy in manufacturing than in services or agriculture. (Rodrik, 2013)

Discussion

- Long-run elasticities highlight opposing forces of provincial inequality
  - Despite common progress, growth has been uneven
  - If the elasticity is not one, the equilibrium growth rate of the province is the long-run elasticity time of the average, so they are diverging, though it may take some time for the divergence to be apparent, and the parameters may not be stable over the long run
  - e.g. episodic failure of cointegration (Chudik, Pesaran and Smith, 2022)