

Specialization and Divergence: Lessons from San Francisco and Los Angeles

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THE RISE
AND FALL
OF URBAN
ECONOMIES



Lessons from San Francisco and Los Angeles

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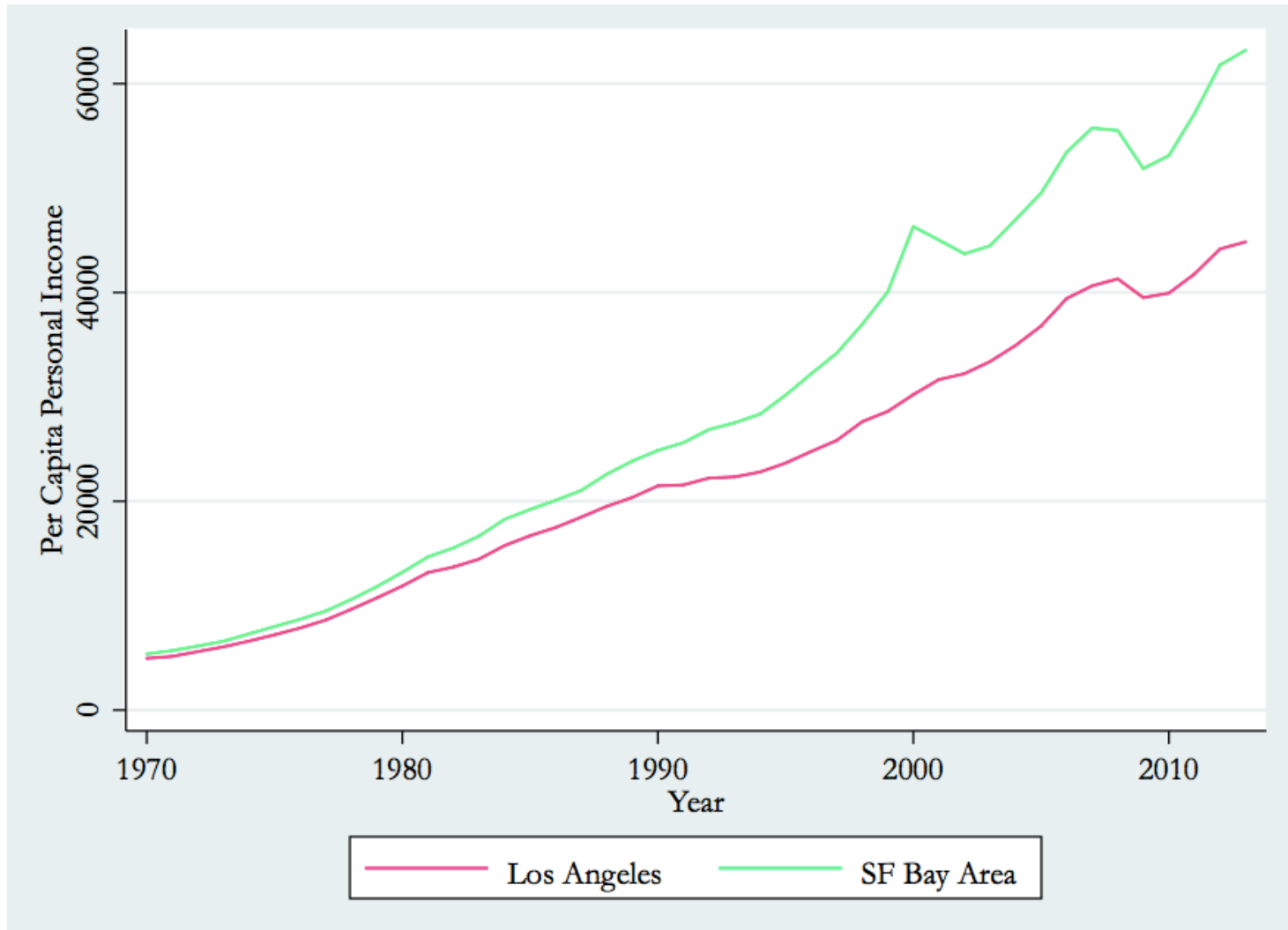
Los Angeles



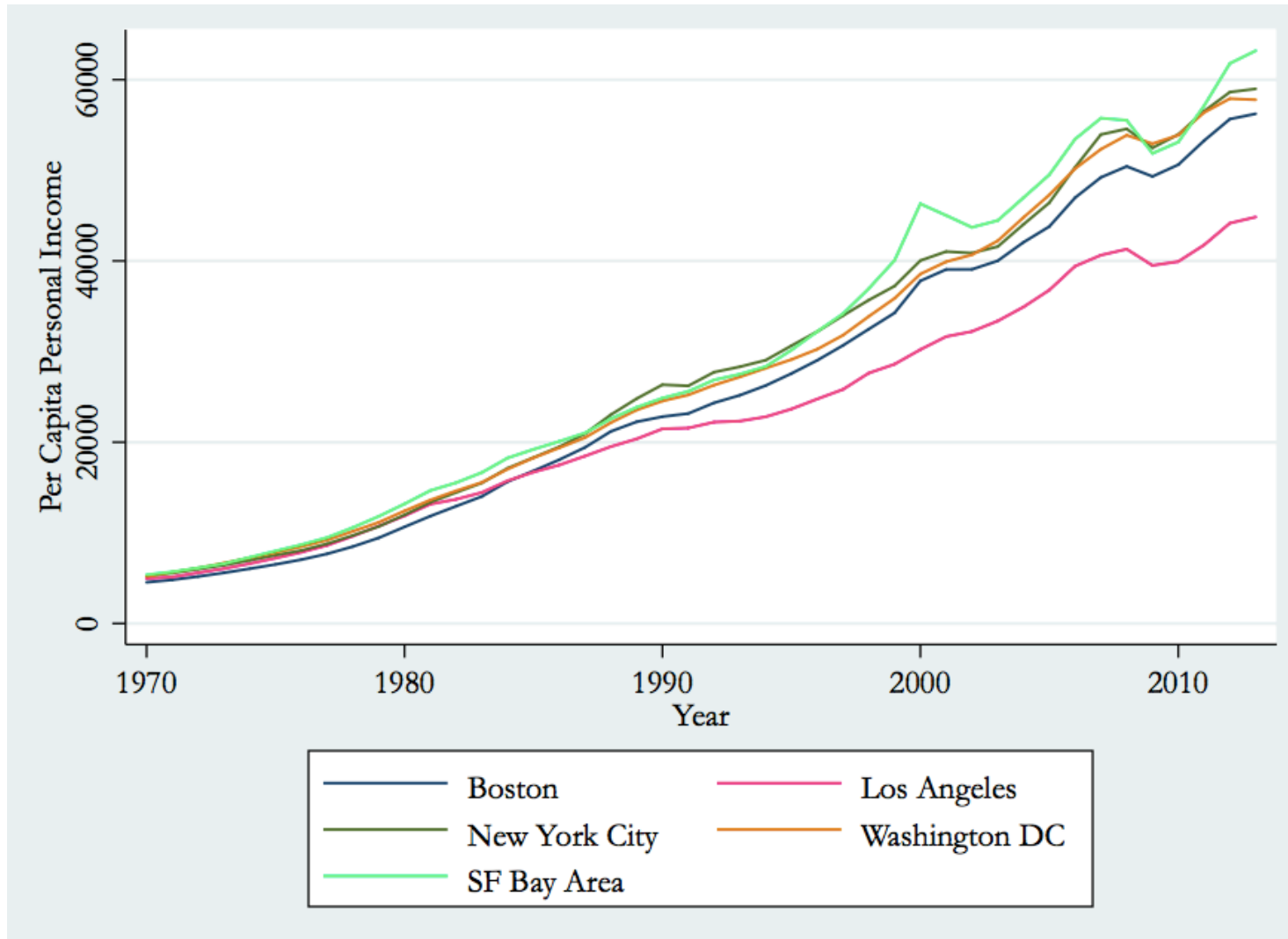
San Francisco



Divergence



LA is leaving top cities club



Specialization: Proximate Cause

- Strong wage effects from divergent specialization
 - LA: high-tech economy adapts downward
 - Aerospace vs loose mix of activities: logistics, fashion, (entertainment as counter-example)
 - SF: high-tech economy adapts upward
 - becoming global hub of 'new economy' centered around Silicon Valley

The Theoretical Toolkit

1. Foundations

- Human capital, and related institutions
- Quality of life/amenities
- ‘Industrial Relatedness’

2. ‘Great man’ theories/luck & accidents

- Breakthrough innovations & ‘Star Scientists’
- Shocks compounded by circular and cumulative causation

The Theoretical Toolkit

- Do LA and SF strongly differ on these criteria?
 - Common account says yes!
- But history written from winners perspective
 - Inevitable or contingent?
 - Close inspection reveals strong similarities
- Two cases: Information technology and biotechnology
 - Relatedness; breakthroughs/luck/great men

CASE 1: INFORMATION TECHNOLOGY

SF Relatedness (pre-1970)

- Radio hobbyists to Semiconductors
 - Hobbyists
 - Lee de Forest – Audion triode – transmitter/amplifier
 - Hewlett and Packard in a rented garage
 - Scale-intensive vacuum tube production
 - Early technologists → major firms Litton and Eitel-McCullough
 - Mass-produced Semiconductor production
 - William Shockley co-invents transistor, off to Palo Alto
 - Sets off major specialization in semiconductors
 - The ‘Traitorous 8’

LA Relatedness (pre-1970)

- Aircraft hobbyists to Semiconductors
 - Martin, Douglas, Loughheed, Hughes, Northrop
 - 1937: Douglas and Lockheed: 92% of all US aircraft
 - 1943: ~200,000 employed
 - Aircraft to Aerospace:
 - Aircraft design to rocket design
 - Aircraft communications to missile guidance
 - Diversifies into wide range of electronics
 - 1960: more semiconductors made in LA than SF

Major client in both regions: Defense Department

SF Great Men, Luck

- Great Men
 - Fred Terman & Stanford Research Institute (founded 1946)
- Breakthroughs
 - Planar Silicon transistors: Noyce and Hoerni @Fairchild Semiconductor
 - Microprocessor: Robert Noyce @ Intel

LA Great Men, Luck

- Great Men
 - Harry Chandler: aircraft sector booster, VC for Douglas and Western Air Express (TWA)
 - Lockheed & Pacific Research Foundation (1945)
- Breakthroughs: ARPANET (1960s)
 - Leonard Kleinrock (UCLA), Paul Baran (RAND) and Donald Davis (UK National Physical Laboratories)
 - 1969: First message sent from UCLA to SRI
 - Network: UCLA, UCSB, SRI and U. Utah

CASE 2: BIOTECHNOLOGY

Relatedness

- Academic research is the main industrial antecedent for biotechnology
 - SF
 - Berkeley, UCSF, Stanford
 - Supported by existing venture capital ecosystem
 - LA
 - UCLA, Caltech, UCSB, UCI, USC
 - Some VC support (mostly nonlocal)

SF Great Men, Luck

- 1973: Stanley Cohen (Stanford) and Herbert Boyer (UCSF)
 - Develop recombinant DNA technology
 - Create organism that replicates genetic information from different species
- 1976: Boyer and Robert Swanson form Genentech
 - 2nd largest biotech firm in the world
 - Patents, spinoffs

LA Great Men, Luck

- 1976: Art Riggs and Keiichi Itakura @ City of Hope
 - first to synthetically create DNA strands
- 1980: Applied Molecular Genetics (Amgen)
 - Original impetus from SV investor Bill Bowes
 - Largest biotech firm in the world
 - Epogen (red blood cells)
- 1986: automatic gene sequencer invented at Caltech

DISTILLING

Comparable Ingredients, Divergent Outcomes

- Both have skills, universities, sunshine, relatedness, luck/breakthroughs
 - SF: Builds and renovates world-leading agglomerations in IT & biotech
 - LA: Employment but not world-leading activities

Differential Performance: Organizational Adaptation

- LA firms remain in a world of central planning and control
 - Lots of great ideas, but no spinoffs
 - IT: ICBMs → satellites; Deep space probes
 - foundations for cellular telephony
 - Advanced semiconductor design
 - Biotech: Amgen: world-leading work, job security
- SF continues adapting
 - Fairchild re-orientes from ‘McNamara Depression’
 - Generates new applications, new customers, spins off new organizations that form local ecosystem

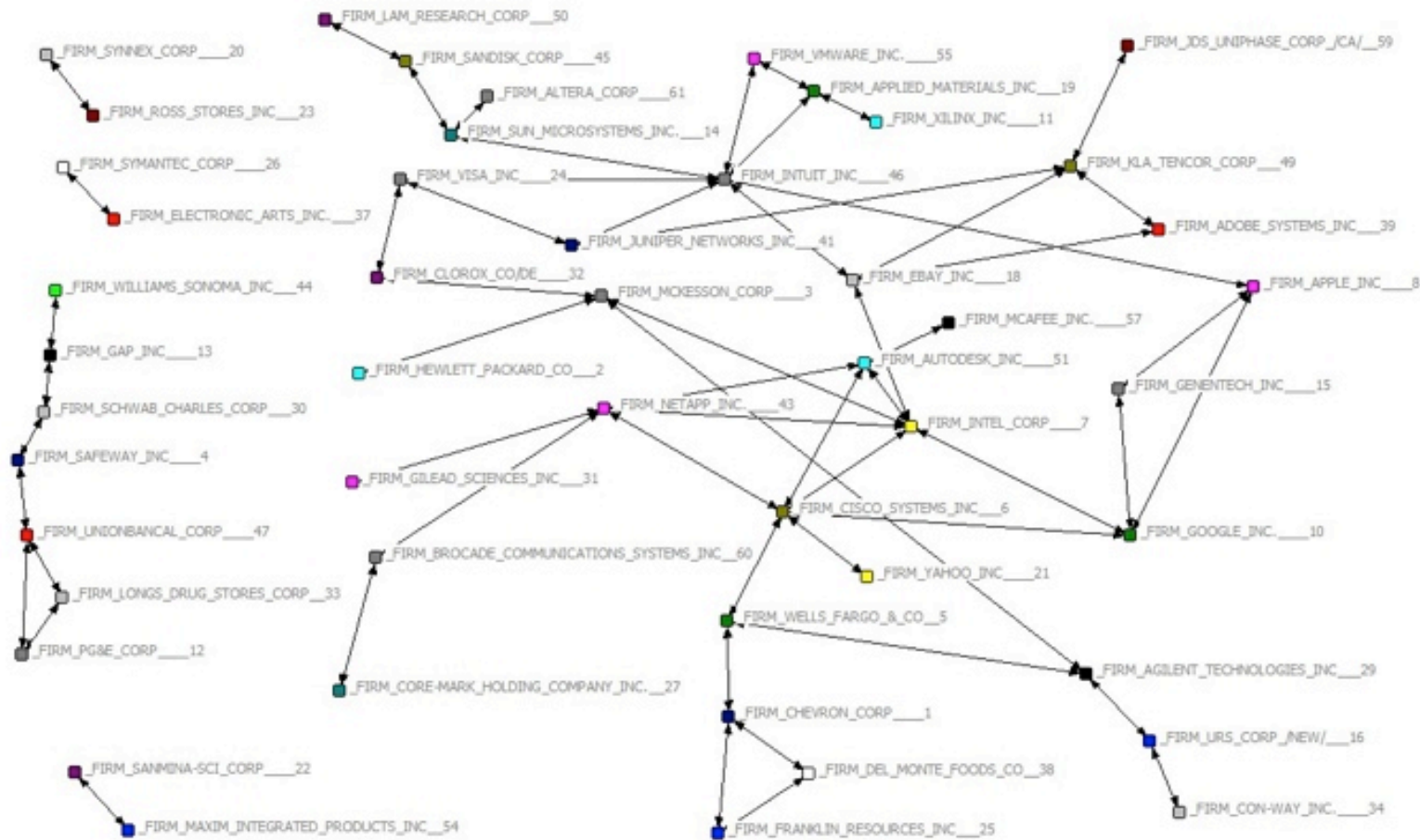
What fostered adaptation in SF and not LA?

- Adaptation requires risk taking and culture of experimentation
 - This exists in key sectors in both regions in the early part of 20th century
 - In LA
 - this spirit gets lost (except for in Hollywood)
 - In SF
 - it is strengthened → ‘tech culture’: hippies and ‘appropriate’ technologists

Key Question: What fostered adaptation in SF and not LA?

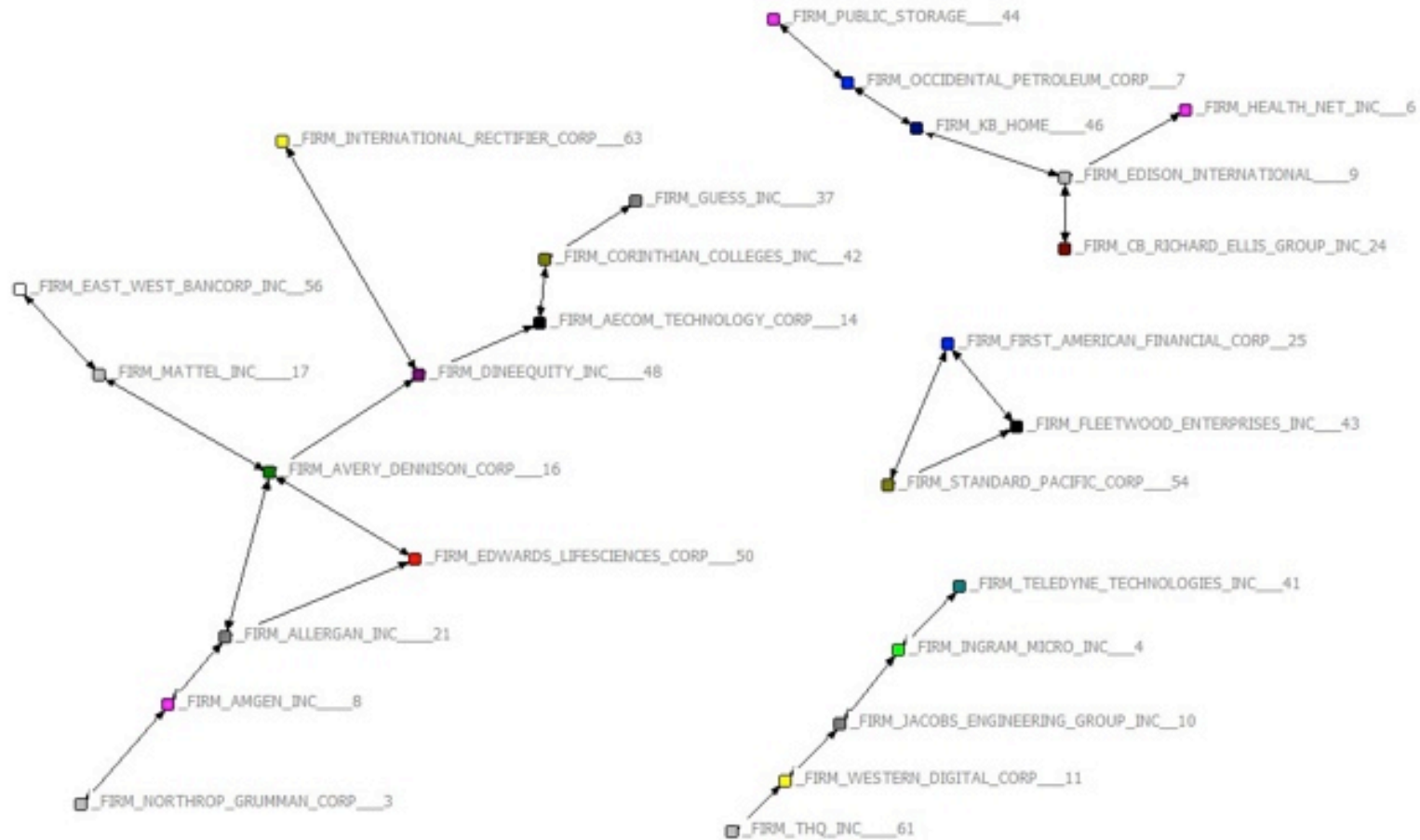
- Being provocative: adaptation requires networks
 - To promulgate experimental culture
 - To share technological and organizational innovations
 - To overcome collective actions problems

Key Question: What fostered adaptation in SF and not LA?



San Francisco: Corporate Board Interlocks, 2010

Key Question: What fostered adaptation in SF and not LA?



Los Angeles: Corporate Board Interlocks, 2010

Key Question: What fostered adaptation in SF and not LA?

- Same pattern re-occurs
 - Links across business, philanthropic and policy elites
 - University and commercial research communities
 - Creative visionaries and technical communities (Hollywood as exception)
- Not a magic bullet, but undertheorized in discussions of divergence and ED

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