

IT'S RAINING MEN! HALLELUJAH? THE LONG-RUN CONSEQUENCES OF MALE-BIASED SEX RATIOS



Pauline Grosjean
&
Rose Khattar



Illustration: David Rowe

QUESTIONS OF INTEREST

What are the implications of male-biased sex ratios on:

- Female labour force participation and occupation*
- Female leisure*
- Norms about gender roles in the short and long run?*



SHORT-RUN EFFECTS – MALE-BIASED SEX RATIOS

- Simple supply and demand models: bargaining position of one gender is proportional to its scarcity – the scarcer sex will benefit from being in shorter supply.
- Scarcer sex will:
 - Marry more;
 - Marry up;
 - Work less; and
 - Enjoy more leisure.

Economic models predict conservative gender roles as result of male-biased sex ratio



LONG-RUN EFFECTS – ORIGINS OF GENDER ROLES

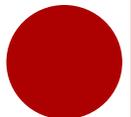
Cultural persistence implies that short run factors can have long term effects through institutions, economic specialization and ...

Culture itself is inherently sticky

- Passed on from parents to children (Bisin and Verdier 2001)
- Individuals with similar views are more likely to marry one another and more likely to stay married (Becker et al. 1977)

Where does culture come from? How does it persist?

- Technology
 - ⇒ Alesina, Giuliano & Nunn (2013): past technology shapes culture
- Marriage market
 - ⇒ ***This paper: How conditions in the marriage market affects emergence and persistence of gender norms***

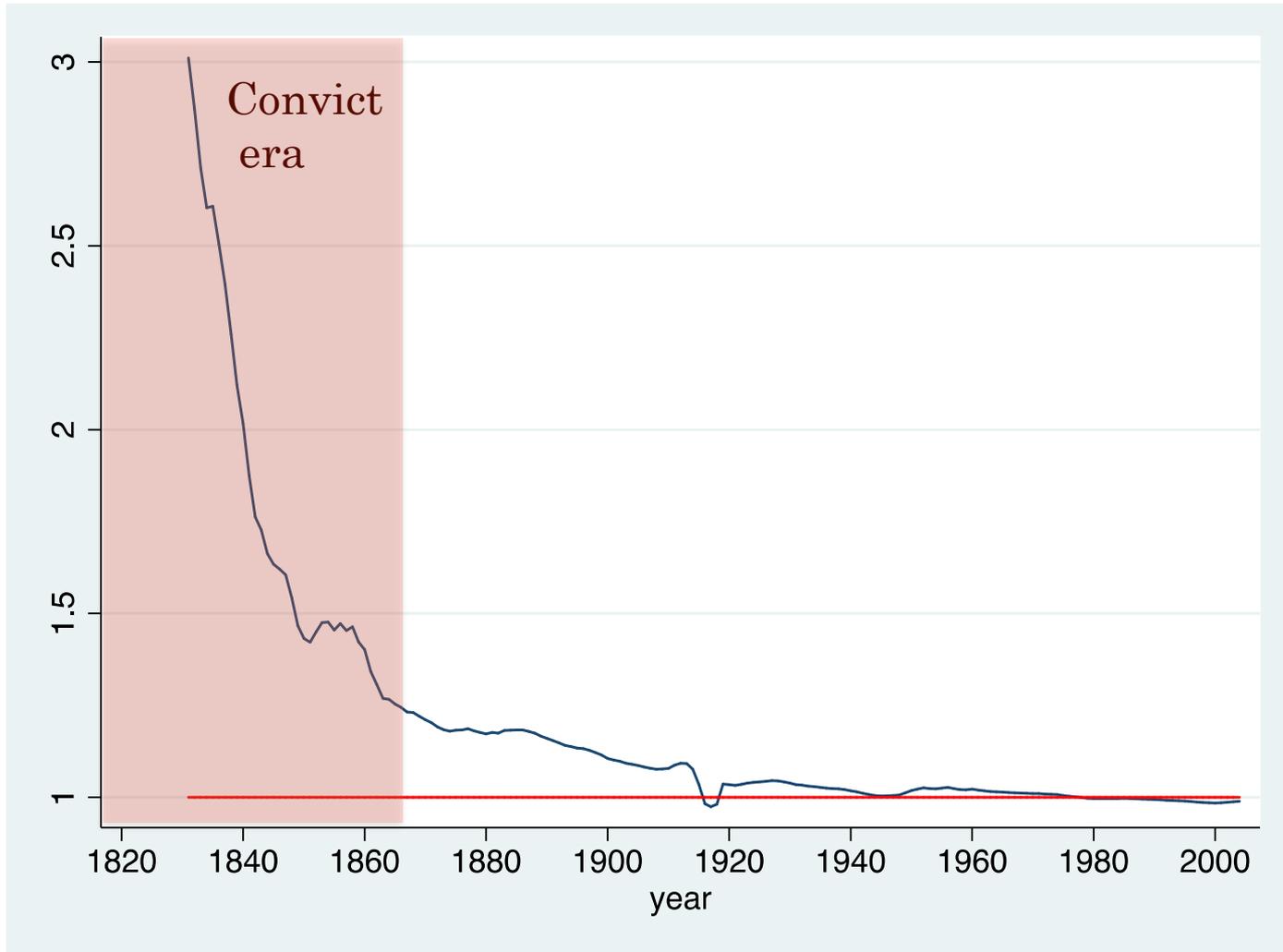


NATURAL EXPERIMENT: MALE-BIASED SEX RATIOS IN AUSTRALIA

- From 1787 to 1868 Australia was a penal colony (after independence of the US)
- 133,000 convict men and 25,000 convict women



SEX RATIO IN AUSTRALIA



CONVICT AUSTRALIA

- Convicts not “hardened criminals” but “ordinary working class men and women” (Nicholas 1988) transported for commonly property offences such as petty theft
- Freed after the term of their sentence (around 7 years)
- Assignment scheme – not free to choose
 - Convicts assigned to settlers, centralised but function of labor needs, mostly agricultural

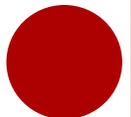
Governor Bligh of New South Wales in 1812: *“They were arranged in our book (...) in order to enable **me** to distribute them accordingly”*



CONVICT WOMEN

19% of the convict population but only 6% of convict labour force

- Demand for female labor should have been high
 - Economy “desperate for labor” (Oxley 2005) & convict women had many needed skills, e.g. domestic service
 - High gender wage gap: 46% (Meredith and Oxley 2005)
- Limited options – alternatives:
 - female prison,
 - assigned (generally in domestic services),
 - marriage
- Marriage most attractive option & enforced
 - Bearing child out of wedlock was a crime
 - Legal right to divorce came late. By end of 19th century: total of only 799 divorce petitions



DATA

- **Short-run – Colonial Censuses: 1836 - 1881**
 - Sex ratio
 - Convicts
 - Female Labour Force
 - Occupations
 - Marriage
- **Long-run:**
 - **2011 Census**
 - Female Labour Force
 - Occupations
 - **Household, Income and Labour Dynamics in Australia (HILDA)**
 - Views on gender roles
 - Leisure



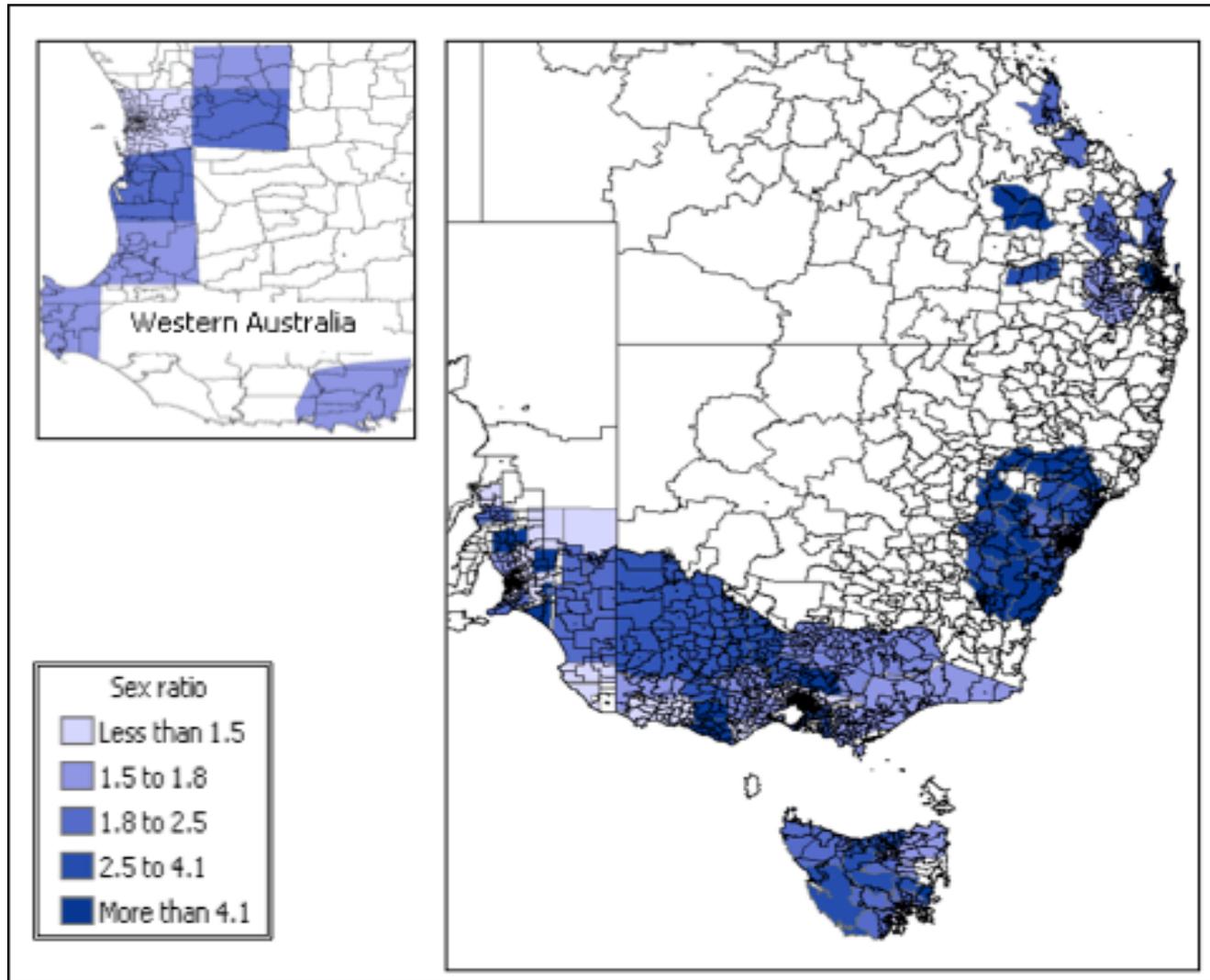
MATCHING HISTORICAL COUNTIES TO POSTAL AREAS TODAY

- Digitisation of historical maps from the National Library and State Libraries
- Example of Postal Area shapefile overlaid with 1836 NSW shapefile



GENDER IMBALANCE IN MID 19TH CENTURY

- Total sex ratio (#men / #women) of around 3 on average
- Convict sex ratio of around 30 on average



IDENTIFICATION

- Treatment: sex ratios
- Varies across geographical areas
- Time and state fixed effects
- Very few observable differences between high/low sex ratios areas, historically and today. In particular, no difference in initial economic specialisation or mineral endowments
- Control for characteristics today that could affect outcomes and be correlated with treatment
 - Initial economic specialisation, mineral endowments, land characteristics, education, urbanisation



IDENTIFICATION

- IV strategy:
 - Instrument overall sex ratio by convict sex ratio
 - Convicts, by definition, not free to move
 - Assignment scheme determined treatment allocation
 - Labour requirements: local industrial specialisation
 - Geographic characteristics
 - We control for industrial specialisation that determined convict allocation,
 - and for total proportion of convicts



EMPIRICAL SPECIFICATION

$$y_{ipcs} = \alpha_1 + \beta_1 \text{SexRatio}_{cs} + X_{pcs}^G \Gamma_1 + X_{cs}^H \Pi_1 + T_{pcs}^C \Lambda_1 + X_{ipcs}^C \Theta_1 + \delta_s + \delta_t + \varepsilon_{ipc}$$

X_{pc}^G : time-invariant geographic postal area characteristics: latitude, longitude, land characteristics, mineral endowments

X_c^H : historic controls: economic specialisation (11 sectors), historical population

X_{ipc}^C : individual controls (gender, marital status, age, education, income, Australian born)

T_{pc}^C : postal area contemporary controls (sex ratio, urbanization)

δ_s : state dummies

δ_t : HILDA wave dummies (if applicable)

Clustered standard errors at historical county level (91 clusters)



HISTORICAL RESULTS

- Gender imbalance associated with:
 - Higher marriage rates for women
 - Lower female labour force participation
 - Fewer women in high ranking occupations
- Robust in panel (with county and time fixed effects) and in cross section

Compositional or bargaining power?



GENDER IMBALANCE, FEMALE WORK AND MARRIAGE BETWEEN 1836 AND 1881

	1	2	3	4
	Married women (% women)	Married men (% men)	Female labor force participation (% married women)	Women in high- ranking occupations (% working women)
Sex ratio	2.481*** (0.794)	-1.515*** (0.285)	-13.205** (5.579)	-14.100*** (3.603)
Observations	412	412	205	247
R-squared	0.234	0.120	0.377	0.619
Number of counties	94	94	70	77
Male LFP/Occupation	No	No	Yes	Yes
County FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes



PERSISTENCE, TO THIS DAY

- More conservative attitudes towards gender roles: *“It is better for everyone involved if the man earns the money and the woman takes care of the home and children”*
 - 1 s.d. increase in historical sex ratio: decrease in the share of women professionals by 0.06 s.d.
 - Comparable to 45% of the effect of identifying as a female versus a male respondent
- Male-biased historical sex ratio associated with:
 - Decrease in hours supplied by women in labour force;
 - Decrease in women employed as professionals;
 - Increase in leisure for women (don't increase work at home)
 - 1 s.d. increase = 2.3 hours per week increase in leisure for women, which is more than half the average (negative) gap in leisure time between women and men
 - Less likely to “feel rushed” and more likely to enjoy “spare time”



REGRESSION RESULTS: GENDER ROLES

	1 Female labor force participation	2 Log hours worked	3 Women in high- rank occupations	4 Leisure time	5 Progressive attitude: Female work
Historical sex ratio	-0.116+ (0.075)	0.015*** (0.003)	-0.445*** (0.135)	-0.266 (0.238)	-0.036*** (0.009)
Female		-0.291*** (0.023)		-4.807*** (0.694)	0.464*** (0.017)
Female*Historical sex ratio		-0.021*** (0.007)		0.769** (0.300)	
State FE	Yes	Yes	Yes	Yes	Yes
Geographic controls	Yes	Yes	Yes	Yes	Yes
Individual controls	-	Yes	-	Yes	Yes
Contemporary poa controls	Yes	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes	Yes
Minerals and land type	Yes	Yes	Yes	Yes	Yes
Male LFP	Yes	No	No	No	No
Male high-rank occup.	No	No	Yes	No	No
Observations	1,862	30,894	1,861	27,389	42,284
Number of counties	88	78	88	78	78
R-squared	0.731	0.148	0.573	0.174	0.168

Robust standard errors clustered at historical county level.

HOW CAN IMPACTS PERSIST IN THE LONG RUN?

Cultural persistence

- At least part of: explained by emergence of norms about the gender roles & relative bargaining power of men and women in relationships due to imbalanced sex ratios
- Successful cultural traits spread

Formal institutions

- Within-country, within-state analysis

Industrial specialization, education

- Control for this, historically and today
- At best very weak evidence, and would not explain *positive* effect on women leisure



CULTURAL PERSISTENCE

Vertical Transmission – within families

- No influence on people not born from Australian parents
- People with Australian parents more progressive on average, but not where gender imbalance was high

Migration

- Migration makes experimentation less costly and facilitates transition away from convention
- Historical sex ratio associated with conservative gender norms in migration low areas , but not high

Homogamy – marriage market

- Only in areas where homogamy is high
- Strategic complementarity of views on gender roles among potential spouses



CULTURAL PERSISTENCE: VERTICAL TRANSMISSION, MIGRATION & HOMOGENY

	1	2	3
	Progressive attitude: Female work		
Historical sex ratio	0.014 (0.015)	0.038* (0.021)	0.067 (0.050)
Australian parent	0.302*** (0.060)		
Australian parent * Historical sex ratio	-0.059*** (0.021)		
Low migration		0.102 (0.062)	
Low migration * Historical sex ratio		-0.074*** (0.019)	
High Homogamy			0.087 (0.132)
High Homogamy * Historical sex ratio			-0.095* (0.051)
State FE	Yes	Yes	Yes
Geographic controls	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes
Present-day postal area controls	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes
Minerals and land type	Yes	Yes	Yes
Observations	42,284	42,284	41,928
R-squared	0.169	0.168	0.168

Robust standard errors clustered at historical county level.

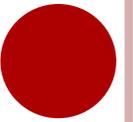


CONCLUSION

Our contribution

- First study of long term legacy of gender imbalance
- Long term effects of gender imbalance – more than 100 years later effects persist
 - The nearly one hundred million missing women in the world today may deeply affect labour markets and gender norms not only in the years to come
- Influence of culture on economic outcomes and how culture emerges and persists.





ROBUSTNESS

- Robust to:
 - IV strategy
 - Measuring the sex ratio later, in 1861
 - 1933 Census
 - Propensity score matching on basis of geographic characteristics and historical economic specialization
 - Controlling for population density, distance to ports
 - Non linear effects
 - Excluding metropolitan areas
 - Removing outliers with less than 100 women historically (6% of sample), or with sex ratios higher than 5, or with less than 300 people historically
- Test by Oster (2015) suggests that influence of unobservables would need to be 2 to 14 as large as influence of all included controls to drive effect away
- Placebo regressions with randomly allocated sex ratios never significant



OPPOSITE ROLES OF MIGRATION AND HOMOGENY IN CULTURAL PERSISTENCE

	1	2	3	4
	Progressive attitude			
Historical sex ratio	0.053** (0.026)	0.038* (0.021)	0.069 (0.047)	0.049 (0.047)
Low migration	0.101* (0.058)	0.102 (0.062)		
Low migration * Historical sex ratio	-0.078*** (0.025)	-0.074*** (0.019)		
High Homogeneity			0.087 (0.112)	0.061 (0.127)
High Homogeneity * Historical sex ratio			-0.088* (0.048)	-0.080* (0.049)
Geographic controls	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes
Contemporary poa controls	Yes	Yes	Yes	Yes
Minerals and land type	No	Yes	No	Yes
Historical controls	No	Yes	No	Yes
Observations	42,866	42,284	42,947	42,947
R-squared	0.166	0.168	0.167	0.168
State FE	Yes	Yes	Yes	Yes
HILDA wave FE	Yes	Yes	Yes	Yes

Robust standard errors clustered at historical county level.



A WORK IN PROGRESS ...

So what is next?

- Health outcomes (joint with V. Baranov)
- Preferences for masculine / feminine traits (joint with R. Brooks)
- Gender corporate culture and firm performance (joint with R. Adams and A. Akyol)
 - Influence of social norms on corporate culture and firm productivity (Bloom et al. 2012)
 - Do social norms held about gender influence corporate culture?
 - How does this *gender corporate culture* influence firm performance?

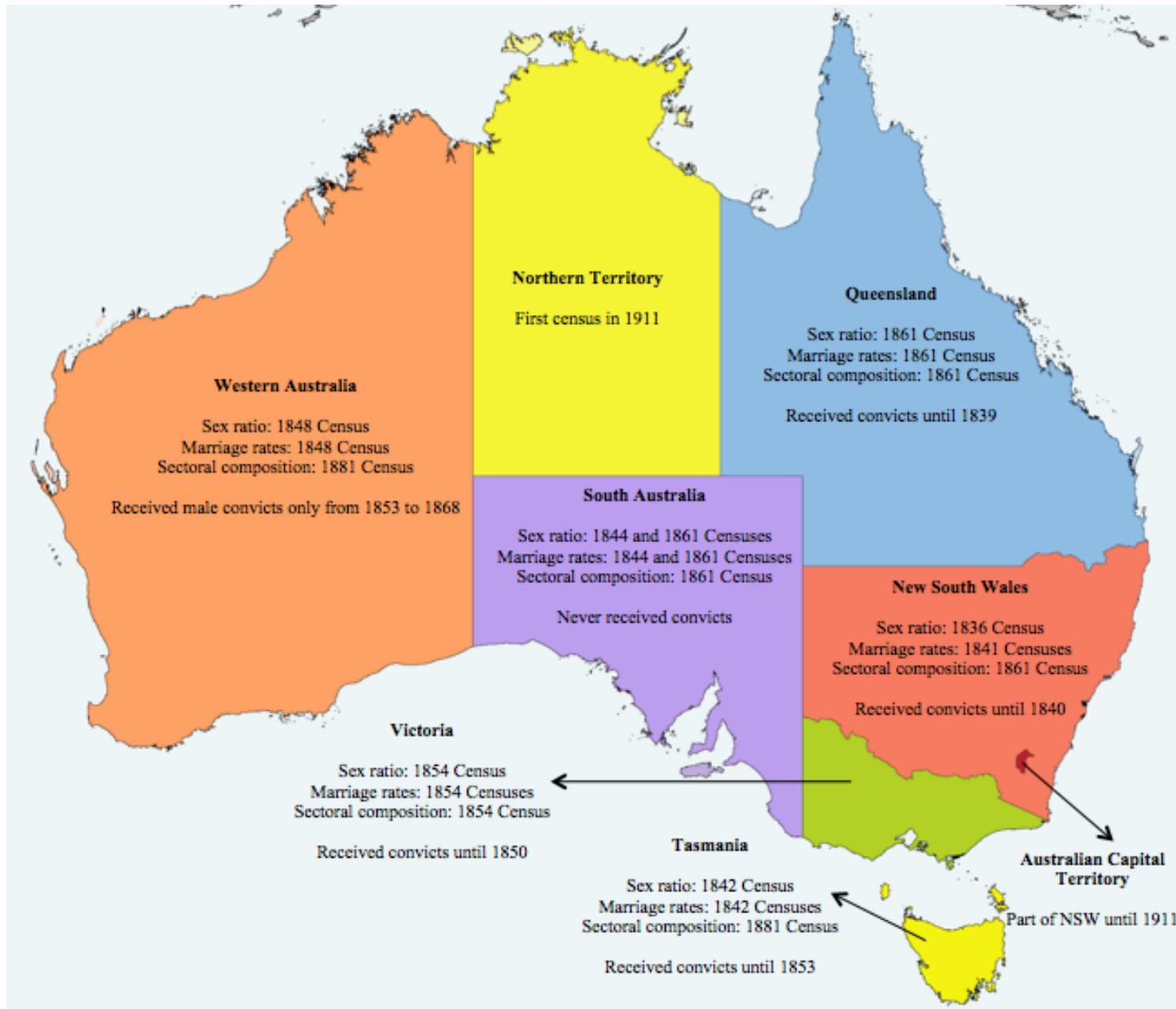


GENDER CORPORATE CULTURE AND FIRM PERFORMANCE

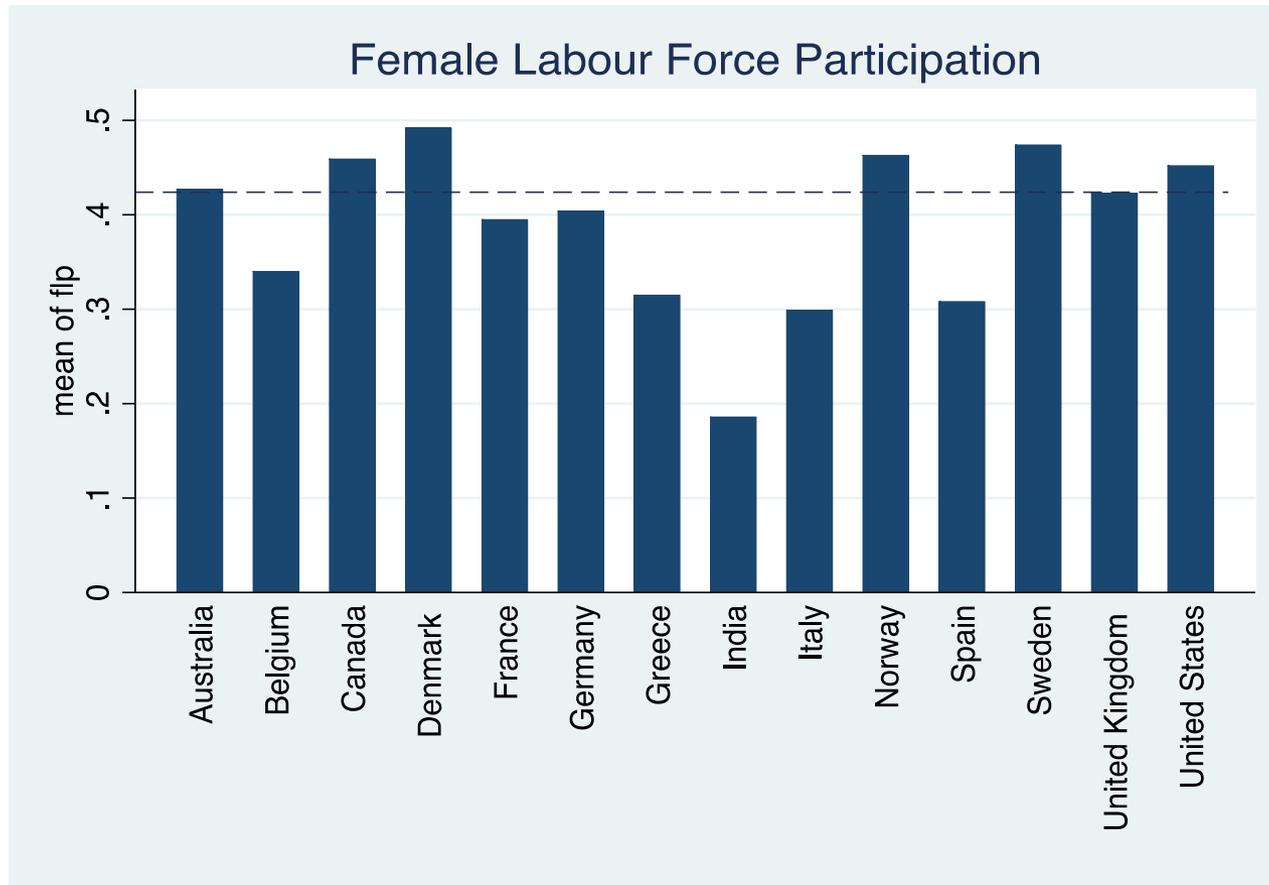
- Annual reports on workplace programs for women in all non-public sector organisations (Workplace Act)
 - 21,787 compliance reports for the 2001-2011 period
 - We match reports to 2,824 firm-year obs. for listed firms
- Measure of gender corporate culture:
 - Topic modeling for practices
 - Sentiment analysis
- We find that more female friendly workplaces:
 - Have more women in management and executive ranks
 - Have higher ROA and market to book value
- Firms in areas with more progressive values have more female friendly gender corporate culture
- Next: instrument gender corporate culture by historical sex ratio



FIRST HISTORICAL CENSUS



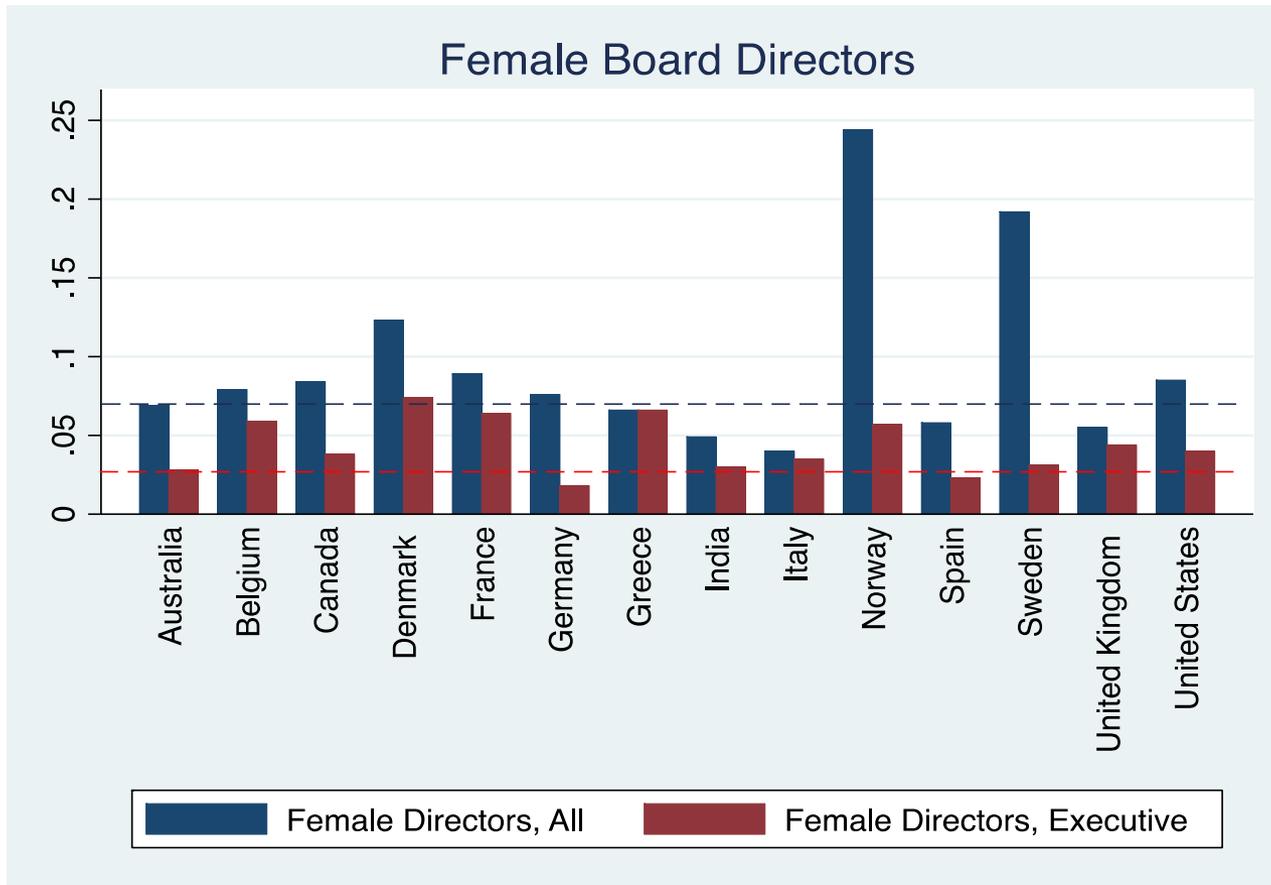
AUSTRALIA TODAY



Source: Adams and Kirchmaier 2014



AUSTRALIA TODAY



Source: Adams and Kirchmaier 2014

