

Duration modelling of education effects and gendered outcomes in the Australian graduate labour market

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Motivation

World Economic Forum Gender Inequality Report 2020, 2021

Australia's ranking	2020	2021
Education	#1	#1
Economic Participation & Opportunity	#49	#70
Health and Survival	#104	#99
Political Empowerment	#57	#54
Global Gender Gap Index	#44	#50



Why has Australia's remarkable success in closing the gender education gap not translate into improved labour market outcomes for Australian women?

Aims of the Study

- to systematically investigate labour market inequalities between educated men and women in Australia
- to use duration modelling techniques identify the market and non-market factors that drive observed disparities
- to use HILDA data to understand the role of education

Kaplan Meier Approach

Cox Proportional Hazard Modelling

Duration Modelling

Spell

Event

Kaplan-Meier (KM) Approach

- $S(t) = \Pr(T > t)$ survival function, probability of survival after time t .
- $P(t) = \Pr(T \leq t)$ cumulative distribution of T
- $p(t) = \frac{dP(t)}{dt}$ probability density function.
- $h(t) = \frac{p(t)}{S(t)}$ hazard function, the instantaneous probability of exiting a spell

Duration Modelling

Cox Proportional Hazard modelling

- $h(t|x) = \underbrace{b_0(t)}_{\text{baseline hazard rate}} \exp \left(\underbrace{\sum_{i=1}^n b_i(x_i)}_{\text{the proportional change that can be expected in the hazard } h(t|x)} \right)$ is the hazard ratio

HILDA Panel Data

Household, Income and Labour Dynamics in Australia (HILDA) Survey:
17,000 individuals in 9,500 Australian households, 2001 through to 2018.

Analytical Sample

- All who have **completed a tertiary degree**.
- **2030 unique individuals**
- **Demographic characteristics:** age, gender, marital status, health, ethnicity, etc
- **Individual job market data:** occupation type, industry type, broad conditions of contract as well as periods of unemployment or voluntary absence from the labour market and why.

Data Summary

Table 1. Description of Variables

Variable		Male	Female	All
Gender		40.7	59.4	N=14192
Age Group	< 25	14.8	16.9	16.0
	25-44	71.7	67.5	69.2
	45-64	13.5	15.7	14.8
Location	Rural	18.9	23.1	21.4
	Urban	81.1	76.9	78.6
Education (% Row)				
-PhD/Masters		41.7	58.3	100.0
-Grad Dip/Cert		39.9	60.1	100.0
- Bachelors/Honours		40.5	59.5	100.0
Education (% Column)				
-PhD/Masters		26.1	25.0	25.4
-Grad Dip/Cert		22.2	22.9	22.6
- Bachelors/Honours		51.7	52.1	51.9
LF Status (% Row)				
- Employed		42.4	57.6	100.0
- Unemployed		43.2	56.8	100.0
- NILF		19.7	80.3	100.0

Data Summary

Table 1. Description of Variables

Variable	Male	Female	All
LF Status (Employed Only, % row)			
-Full Time	46.0	54.0	100.0
-Part Time	29.19	70.81	100
LF Status (Employed Only, % column)			
-Full Time	77.1	62.1	68.2
-Part Time	22.75	37.82	31.7
Job Contract (among those employed; % Column)			
- Fixed Term	14.38	19.77	17.51
- Casual	10.2	12.82	11.72
- Permanent	75.25	67.15	70.54
- Other	0.16	0.26	0.22
Industry			
- Construction	80.74	19.26	100
- Mining	67.55	32.45	100
- Transport, Postal and Warehousing	72.78	27.22	100
- Education and Training	29.17	70.83	100
- Health Care and Social Assistance	22.3	77.7	100

Data Summary

$$GPG = 1 - \frac{(Y_m - Y_f)}{Y_m}$$

Chart 1.

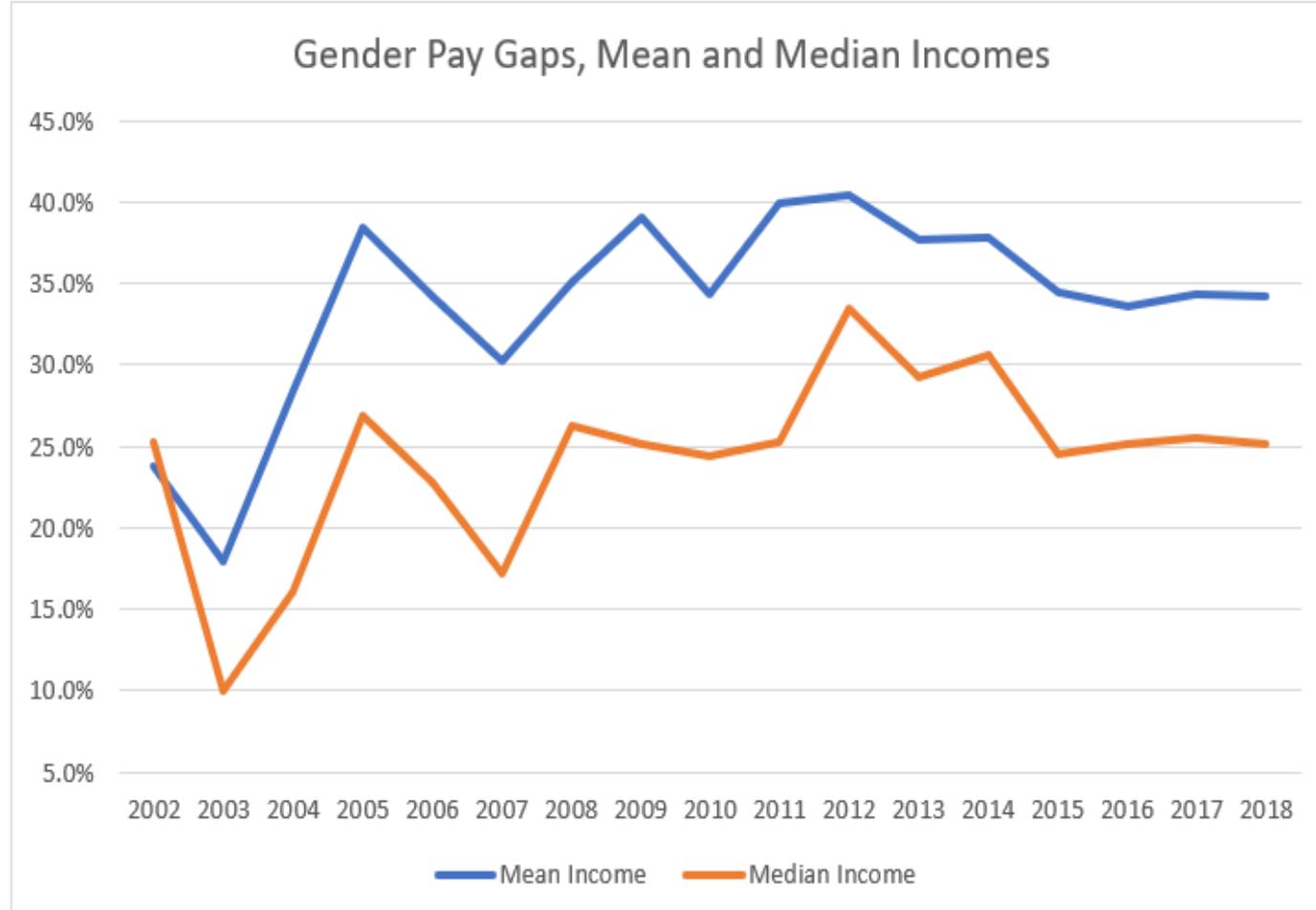
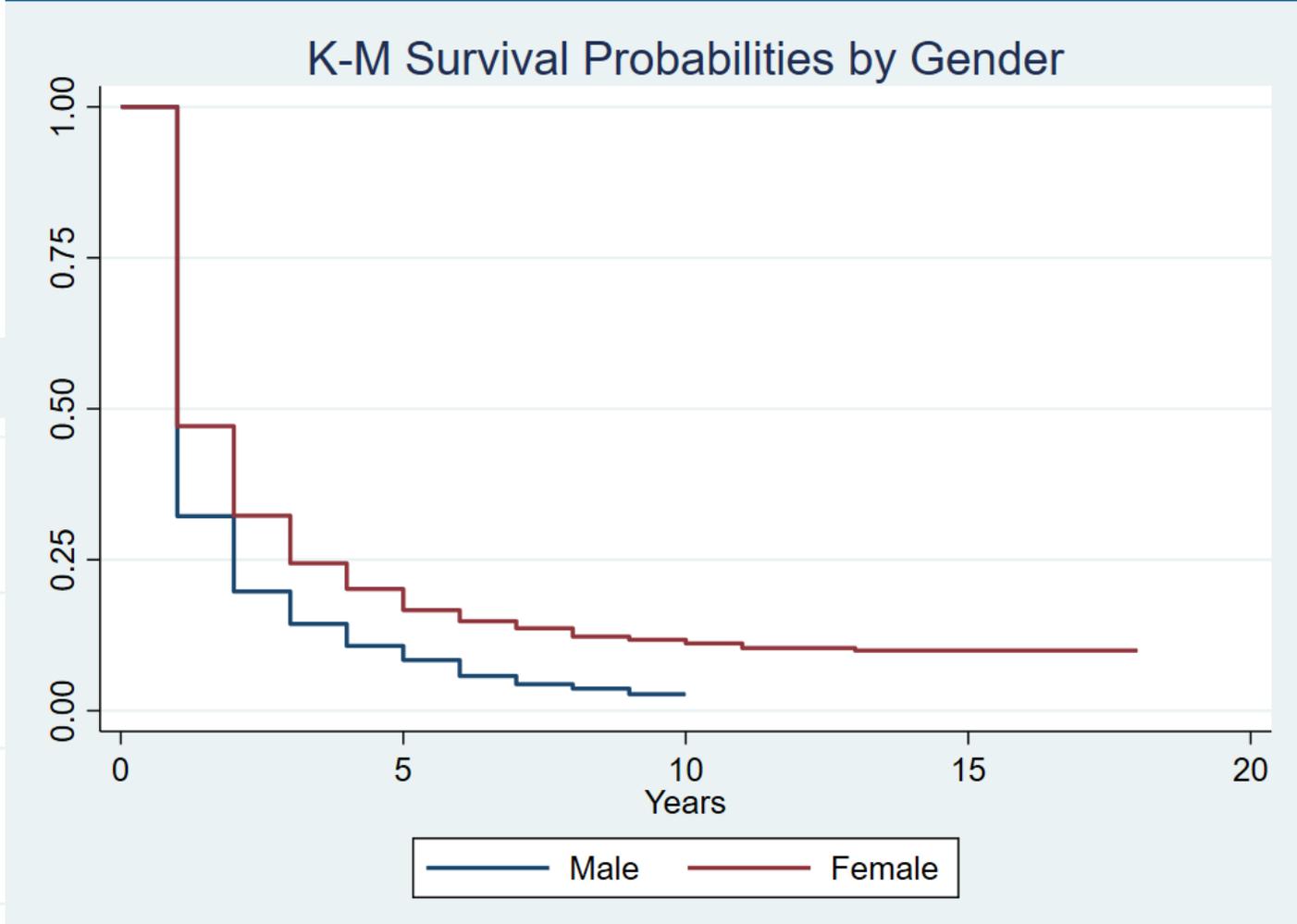
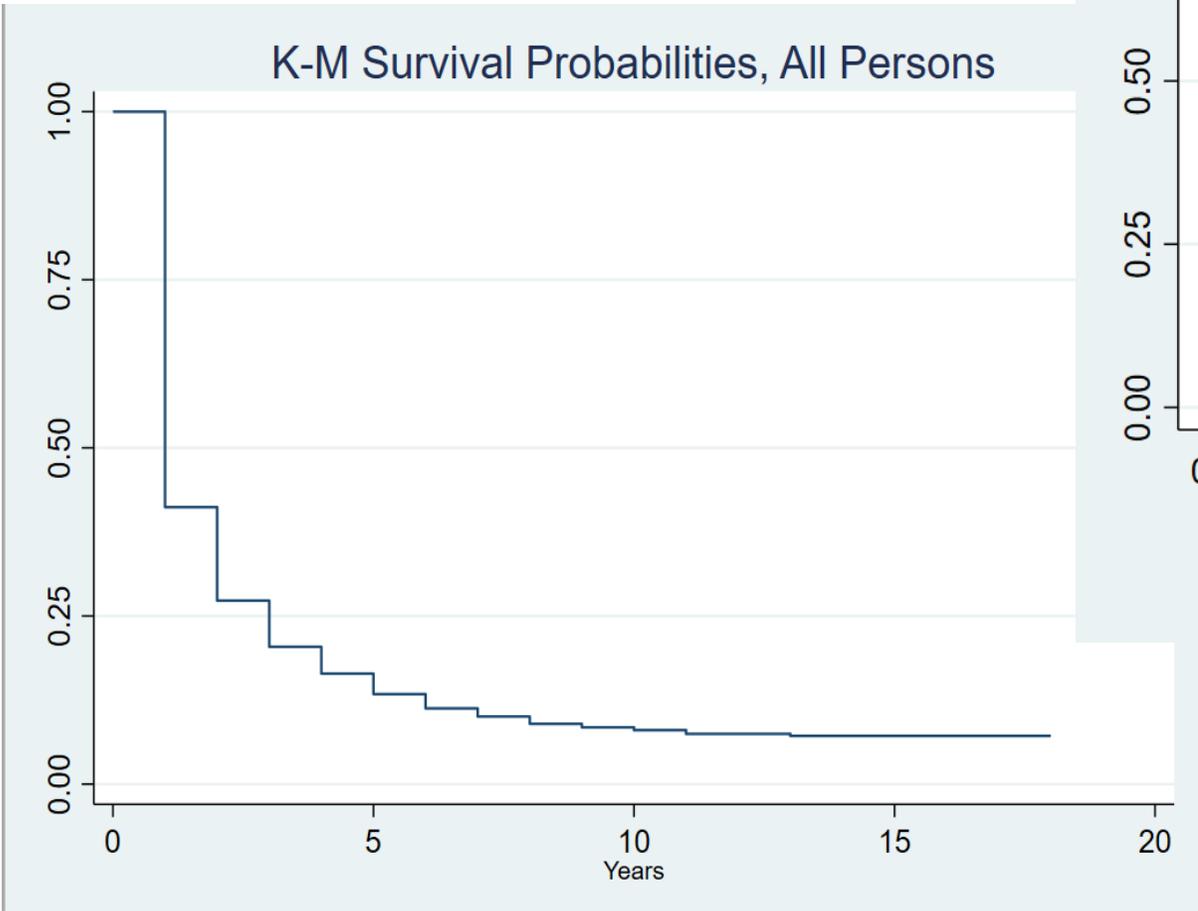


Table 3. Quintile Distribution*

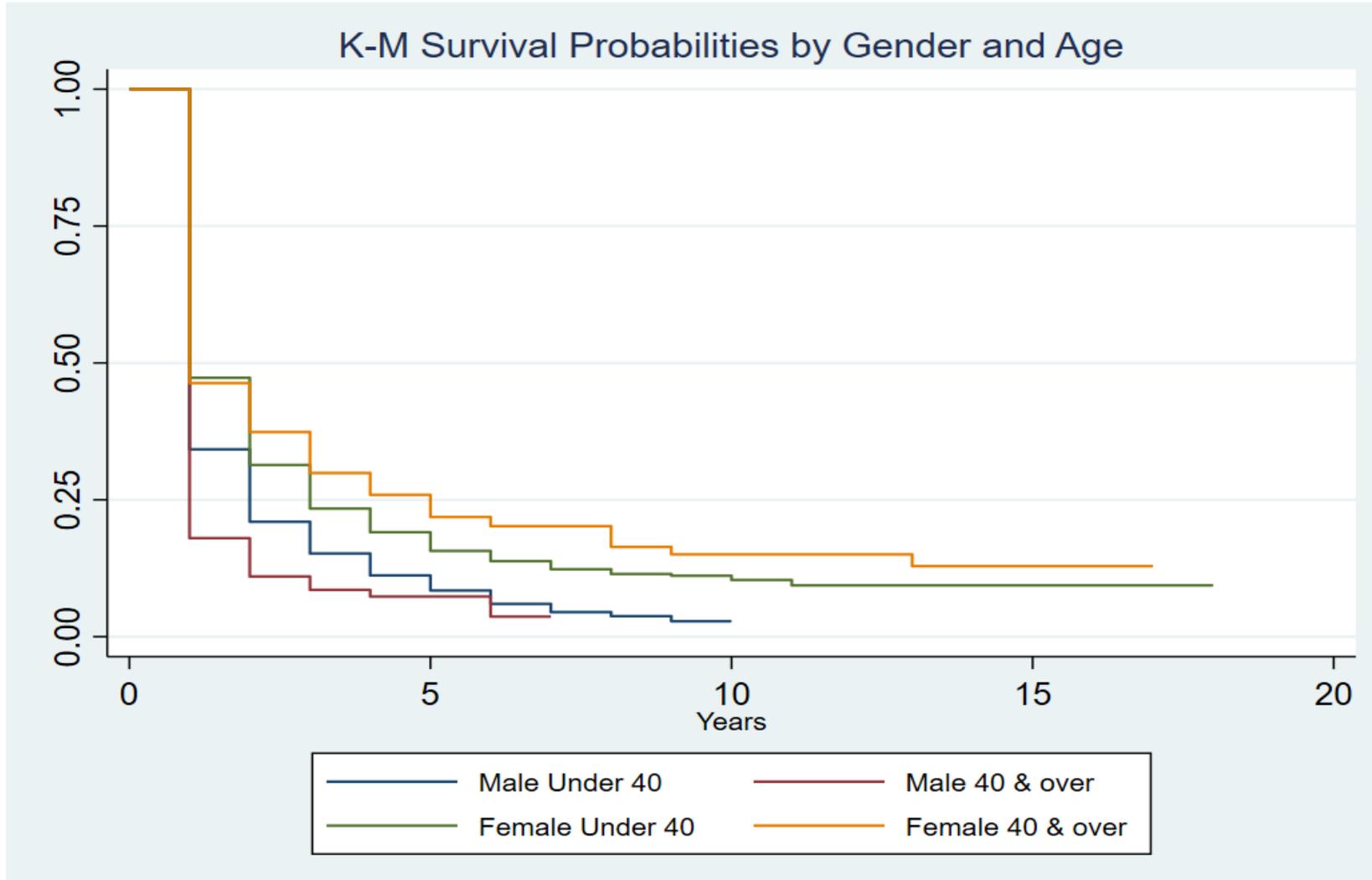
Quintile	Male		Female		All	
	No	% Share	No	% Share	No	% Share
Quintile 1 (lowest)	421	8.5	723	9.8	1144	9.3
Quintile 2	576	11.7	1017	13.8	1593	13.0
Quintile 3	695	14.1	1295	17.6	1990	16.2
Quintile 4	1259	25.5	1809	24.6	3068	25.0
Quintile 5	1981	40.2	2508	34.1	4489	36.5

*using SEIFA Index

Results: Kaplan-Meier Estimation



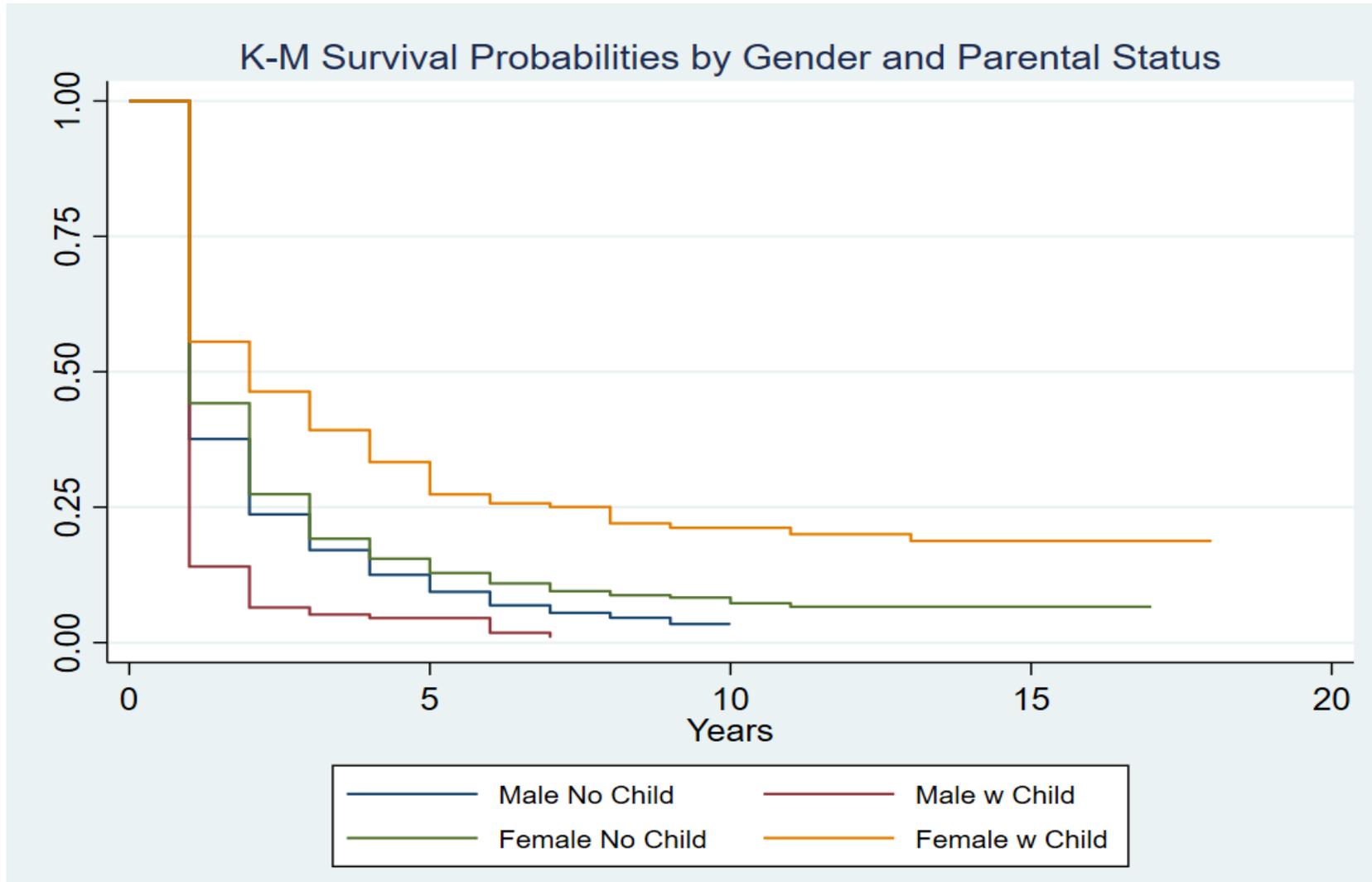
Results: K-M Estimation



KEY POINTS

- Women stay longer in the non-FT employment compared to men.
- Older women stay longer in non FT employment compared to younger women.
- In contrast, older men appear to find FT job quicker than younger men.
- FT Employment probabilities for men converge over time; no convergence is seen the probability curves for women.

Results: K-M Estimation



KEY POINTS

- Large gaps in the probabilities between females with and without children evident.
- Parent females have lengthier times in unemployment compared to non-parent females
- Compared to earlier graphs, these probability graphs show largest gaps between female groups.
- Further, the gap between these two women groups remained large over time.
- Among men, married men exit the unemployment job queue quickest

Table 2. Cox Proportional Hazard Modelling Results: Objective Measures - Employment and Earnings Models

Variables	Model 1: Finds Full Time Job			Model 2: Finds Permanent Job			Model 3: Total Earnings > Mean Earnings		
	ALL	Male	Female	ALL	Male	Female	ALL	Male	Female
Female ⁺	-0.260** (0.000)			-0.154*** (0.005)			-0.413*** (0.000)		
Age	0.006 (0.203)	0.003 (0.651)	0.009 (0.107)	-0.001 (0.800)	0.005 (0.518)	-0.003 (0.601)	0.029*** (0.000)	0.025*** (0.002)	0.035*** (0.000)
Parent ⁺	-0.247*** (0.003)	0.122 (0.352)	-0.492*** (0.000)	0.040 (0.643)	0.143 (0.305)	-0.027 (0.810)	-0.168** (0.072)	0.042 (0.771)	-0.371*** (0.003)
Urban ⁺	-0.152** (0.021)	-0.026 (0.811)	-0.218*** (0.009)	-0.133** (0.050)	-0.025 (0.824)	-0.196** (0.021)	-0.004 (0.964)	0.078 (0.531)	-0.046 (0.649)
Highest Degree: PhD/Masters ⁺⁺	0.099 (0.185)	0.083 (0.482)	0.084 (0.385)	-0.006 (0.944)	-0.053 (0.677)	0.004 (0.971)	0.480*** (0.000)	0.402*** (0.003)	0.530*** (0.000)
Highest Degree: Grad Dip/Cert ⁺⁺	-0.012 (0.880)	0.106 (0.393)	-0.112 (0.277)	0.162** (0.042)	0.241* (0.064)	0.108 (0.291)	0.189** (0.034)	0.333** (0.016)	0.049 (0.675)
Area Unemployment Rate	-0.067*** (0.010)	-0.061 (0.121)	-0.077** (0.027)	-0.054** (0.048)	-0.042 (0.315)	-0.066* (0.063)	-0.039 (0.208)	-0.081* (0.071)	0.001 (0.984)
Year of Graduation	-0.016*** (0.004)	-0.016* (0.067)	-0.014** (0.066)	-0.012** (0.035)	-0.016* (0.087)	-0.009 (0.216)	-0.052*** (0.000)	-0.048*** (0.000)	-0.054*** (0.000)

⁺Binary; Base variables are male, no children, single, rural. ⁺⁺Tertiary Degree Base: Bachelors/Honours.

⁺⁺⁺Country of Birth base is Australia. [§]Health Score ranges from 1 (excellent) to 5 (poor), self-rated.

Results: Cox Proportional Hazard Modelling Results

Table 3. Cox Proportional Hazard Modelling Results: Objective Measures - Job Skill Match Models

Variables	Exit Event								
	Job-Skill Match			Total Earnings > Mean Earnings			Total Earnings > Median Earnings		
	ALL	Male	Female	ALL	Male	Female	ALL	Male	Female
Female ⁺	-0.015* (0.776)			-0.434*** (0.000)			-0.372*** (0.000)		
Age	0.006 (0.200)	-0.003 (0.660)	0.013** (0.027)	0.027*** (0.000)	0.024*** (0.004)	0.031*** (0.000)	0.025*** (0.000)	0.029*** (0.001)	0.024*** (0.000)
Parent ⁺	-0.099 (0.238)	0.079 (0.564)	-0.221** (0.040)	-0.139 (0.156)	-0.016 (0.915)	-0.296** (0.029)	-0.176* (0.064)	-0.078 (0.590)	-0.280** (0.030)
Urban ⁺	-0.164** (0.013)	-0.093 (0.402)	-0.205** (0.013)	0.062 (0.442)	0.065 (0.605)	0.058 (0.588)	0.069 (0.371)	0.081 (0.503)	0.063 (0.535)
Highest Degree: PhD/Masters ⁺⁺	0.305*** (0.000)	0.364*** (0.003)	0.273*** (0.004)	0.415*** (0.000)	0.356** (0.011)	0.452*** (0.000)	0.353*** (0.000)	0.275** (0.044)	0.397*** (0.000)
Highest Degree: Grad Dip/Cert ⁺⁺	0.145* (0.063)	0.225* (0.085)	0.087 (0.378)	0.117 (0.205)	0.196 (0.165)	0.024 (0.850)	0.171** (0.053)	0.172 (0.207)	0.155 (0.188)
Job-Skill MisMatch Score ^b				-0.292*** (0.000)	-0.289*** (0.000)	-0.293*** (0.000)	-0.284*** (0.000)	-0.272*** (0.000)	-0.300*** (0.000)
Area Unemployment Rate	-0.032 (0.217)	-0.043 (0.296)	-0.023 (0.496)	-0.027 (0.405)	-0.065 (0.168)	0.004 (0.931)	-0.040 (0.198)	-0.065 (0.158)	-0.022 (0.598)
Year of Graduation	-0.016* (0.004)	-0.020** (0.024)	-0.012* (0.092)	-0.051*** (0.000)	-0.044*** (0.000)	-0.056*** (0.000)	-0.040*** (0.000)	-0.034*** (0.001)	-0.044*** (0.000)

⁺Binary; Base variables are male, no children, single, rural, ⁺⁺Tertiary Degree Base: Bachelors/Honours. ⁺⁺⁺Country of Birth base is Australia.

^aHealth Score ranges from 1 (excellent) to 5 (poor), self-rated. ^bjob mismatch score ranges from 1 (match) to 4 (greatest mismatch).

Results: Cox Proportional Hazard Modelling Results

Table 4. Cox Proportional Hazard Modelling Results: Subjective Measures

Variables	Exit Event					
	I feel secure in my current job			I use my skills in my current job		
	ALL	Male	Female	ALL	Male	Female
Female ⁺	-0.049 (0.451)			-0.023 (0.649)		
Age	0.001 (0.870)	-0.008 (0.380)	0.008 (0.263)	0.005 (0.297)	-0.003 (0.700)	0.009 (0.102)
Parent ⁺	0.019 (0.845)	0.216 (0.168)	-0.142 (0.278)	-0.043 (0.589)	0.099 (0.455)	-0.134 (0.188)
Married/De Facto ⁺	0.114 (0.121)	0.103 (0.430)	0.110 (0.223)	0.053 (0.357)	0.031 (0.767)	0.066 (0.351)
Health Score ^a	-0.100*** (0.009)	-0.118** (0.067)	-0.095** (0.048)	-0.035 (0.235)	-0.068 (0.170)	-0.023 (0.533)
Urban ⁺	-0.084 (0.287)	-0.147 (0.246)	-0.055 (0.588)	-0.113* (0.075)	-0.136 (0.198)	-0.110 (0.167)
Highest Degree: PhD/Masters ⁺⁺	0.045 (0.622)	0.118 (0.427)	-0.017 (0.884)	0.091 (0.206)	0.193 (0.108)	0.045 (0.621)
Highest Degree: Grad Dip/Cert ⁺⁺	0.116 (0.209)	0.210 (0.161)	0.046 (0.698)	0.124* (0.099)	0.268** (0.035)	0.049 (0.602)
COB: English-Speaking ⁺⁺⁺	0.065 (0.626)	0.037 (0.854)	0.079 (0.655)	0.075 (0.492)	0.144 (0.389)	0.019 (0.896)
COB: Non-English Speaking ⁺⁺⁺	-0.363*** (0.001)	-0.542*** (0.002)	-0.218 (0.112)	-0.222*** (0.004)	-0.152 (0.195)	-0.263*** (0.009)
Area Unemployment Rate	-0.070** (0.026)	-0.043 (0.373)	-0.091** (0.029)	-0.037 (0.148)	-0.026 (0.504)	-0.046 (0.163)
Year of Graduation	-0.008 (0.218)	-0.008 (0.433)	-0.007 (0.425)	-0.005 (0.357)	-0.004 (0.609)	-0.004 (0.531)

⁺Binary; Base variables are male, no children, single, rural. ⁺⁺Tertiary Degree Base: Bachelors/Honours.

⁺⁺⁺Country of Birth base is Australia. ^aHealth Score ranges from 1 (excellent) to 5 (poor), self-rated.

KEY POINTS

In general, we find weaker effects compared to our more objective models.

For Model 8 (Feel secure in my job),

* Health is very important for both males and females

*non-English language background matters more for males

*unemployment rate matters more for females

For Model 9 (I use my skills)

*a non-English language background is highly significant for females only

*additionally graduate qualification (dip or cert) matters to males

Concluding Remarks

- women take more time than men to achieve important benchmarks in the labour market
- traditional gender roles that oblige women to taken on a greater share of unpaid and care work in the typical family home hold women back from achieving employment outcomes that are at least on par with men and from maximising their investment in human capital.
- Education expansion helps but not enough to address the persistence of these gaps.
- In terms of policy, our results imply that a package of structural reforms in the labour market may be needed to complement education initiatives.

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