

# Does Cyclical Employment Growth lower Wages?

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# Presentation Outline

- Background
- LEED & data description
- Simple / motivational estimates
- Model specification & results
- Discussion & implications?

# Background (1)

- Hypothesis: lower-skilled/wage workers more likely gain work in upswing and lose jobs in downswing
- Implication: Skill (wage) composition of workforce changes over business cycle
  - more lower-skilled workers in upswing
  - measured average wages underestimate effective wage growth during upswing
  - similarly productivity growth

# Background (2)

- Between 1999 and 2007:
  - W&S employment up 23%:
    - Working-age population up 10.5%
    - LF Participation rate up 3.0pp
    - Unemployment rate down 2.9pp
  - Potentially strong change in (skill/wage) composition of employment:
    - What impact on measured average earnings?
  - Conditions are *perfect* ... we use SNZ's LEED to investigate

# LEED (Linked Employer-Employee Database)

- IRD Employer Monthly Schedule (EMS)
  - Since April 1999 ... to March 2007 – i.e. 8 years
  - Lists all paid employees, their earnings and tax
  - Unique Worker and Employer IRD identifiers ... confidentialised!
  - Separately identifies Working-age Benefit, ACC, PPL, SA, NZS payments
- SNZ Longitudinal Business Frame (LBF)
  - Identifies geographic units (PBN) as “firm”
- Weaknesses
  - **No hours**, minimal worker/firm characteristics, policy instruments, etc.

# Data Description

- Unit of observation for analysis
  - Job-year (ijt) = Worker-i with Firm-j in year-t
  - Use all LEED W&S employment jobs
  - Focus on log(job FTE annual earnings):
    - FTE earnings = annual Earn's/FTE employment
  - Weighted by job FTE annual employment
- Observe:
  - 8 annual years: 1999/00 – 2006/07
  - 3.1m workers, 0.4m firms, 12.7m jobs, and 25.6m job-years

# Summary characteristics

	All Years	1999 / 2000	2006 / 2007	Change
<b>Jobs:</b>				
Total FTE employment	11,046,545	1,239,345	1,526,740	<b>23.2%</b>
Avg FTE earnings	\$46,590	\$45,510	\$48,640	6.9%
Avg log(FTE earnings)	10.600	10.560	10.649	<b>0.090</b>
No. Obs	25,603,780	2,920,770	3,439,660	17.8%
<b>Workers:</b>				
Avg Age	38.5	37.5	39.3	4.8%
Fraction Female	0.462	0.462	0.463	0.2%
Avg FTE employment	0.878	0.875	0.878	0.4%
No. Obs	16,111,360	1,825,410	2,215,200	<b>21.4%</b>
<b>Firms:</b>				
No. Obs	1,654,450	195,040	220,890	<b>13.3%</b>

# Some simple estimates

- Characterise workers as:
  - *Continuers*: work in each year
  - *Entrants*: don't work 1999/00, work 2006/07
  - *Exiters*: work 1999/00, not 2006/07
  - *Multi-transitions*: miscellaneous employment
- Using this characterisation, consider two estimates of composition change impacts on average earnings growth between 1999/00 and 2006/07

- 1. Continuers' earnings growth = 0.17
  - C.f. total sample growth = 0.09, suggests composition impact of -0.08
  
- 2. Changing mix of workers
  - C.f. entrants and exiters vs continuers suggests composition impact of -0.054:

	Continuers	Entrants	Exiters	Multi-trans
1999/00 Emp share	0.67	–	0.21	0.12
2006/07 Emp share	0.60	0.28	–	0.12
Relative log(earns)	0.07	-0.19	-0.02	-0.16
Impact contribution	<b>-0.005</b>	<b>-0.053</b>	<b>+0.004</b>	<b>0.000</b>

# But ...

- 1. ignores:
  - Experience growth of Continuers ( $\approx 0.04$ )
  - Also, relative *hours* changes ( $\approx -0.02$ )
- 2. ignores:
  - Subgroup earnings from different sub-periods
  - Changing mix & match of firms
- Regression-adjust for aggregate changes, and observed & unobserved worker & firm effects

# Econometric model specification:

$$y_{ijt} = X'_{it}\beta + \tau_t^M + \tau_t^F + \theta_i + \psi_j + \varepsilon_{ijt}$$

- $y_{ijt}$  = log(FTE earnings) of worker- $i$  in firm- $j$  in year- $t$
- $X_{it}$  observed demographics (male & female quartics in age)
- $\tau_t^M$  &  $\tau_t^F$  male and female aggregate time-effects
- $\theta_i$  unobserved worker (fixed) effect – *premium* earned in all jobs
- $\psi_j$  unobserved firm (fixed) effect – *premium* paid to all workers
- $\varepsilon_{ijt}$  idiosyncratic job-year residual earnings
- $\tau_t^M$  &  $\tau_t^F$  are composition-adj growth estimates

# Results: Annual Comparisons

Sample (Model $R^2=0.89$ )	Log (Earnings) ( $y_{ijt}$ )	Sex & Age ( $X'_{it}\beta$ )	Time Effects ( $\tau_t$ )	Worker Effects ( $\theta_i$ )	Firm Effects ( $\psi_j$ )
All years	10.600	10.600	0	0	0
Relative to all years:					
1999/2000	-0.040	-0.002	-0.070	0.025	0.006
2000/01	-0.043	-0.001	-0.067	0.020	0.005
2001/02	-0.027	0.001	-0.043	0.012	0.003
2002/03	-0.021	0.002	-0.027	0.004	0.000
2003/04	0.006	0.001	0.010	-0.003	-0.002
2004/05	0.022	0.000	0.035	-0.009	-0.003
2005/06	0.035	-0.001	0.056	-0.017	-0.003
2006/07	0.049	0.000	0.076	-0.023	-0.003
<b>99/00—06/07 changes</b>	<b>0.090</b>	<b>0.001</b>	<b>0.146</b>	<b>-0.049</b>	<b>-0.009</b>

# Entry / Exit Subgroups

<b>Sample</b> (Model $R^2=0.89$ )	<b>Log</b> <b>(Earnings)</b> ( $y_{ijt}$ )	<b>Sex</b> <b>&amp; Age</b> ( $X'_{it}\beta$ )	<b>Time</b> <b>Effects</b> ( $\tau_t$ )	<b>Worker</b> <b>Effects</b> ( $\theta_i$ )	<b>Firm</b> <b>Effects</b> ( $\psi_j$ )
All years	10.600	10.600	0	0	0
<b>Workers</b> (relative to full sample):					
Continuers	0.069	0.034	-0.002	0.028	0.010
Entrants	-0.187	-0.122	0.036	-0.070	-0.031
Exiters	-0.021	-0.008	-0.039	0.023	0.003
Multi-transition	-0.159	-0.040	0.002	-0.097	-0.024
<b>Firms</b> (relative to full sample):					
Continuers	0.020	0.006	-0.001	0.008	0.007
Entrants	-0.076	-0.032	0.038	-0.037	-0.046
Exiters	-0.076	-0.011	-0.044	-0.019	-0.003
Multi-transition	-0.147	-0.037	-0.003	-0.053	-0.054

# Decomposing Earnings change

- Into subgroup relative earnings differences and/or employment share changes:

$$\begin{aligned}
 (\bar{Y}_1 - \bar{Y}_0) &= \underbrace{w_0^C * (\bar{Y}_1^C - \bar{Y}_0^C)}_{C: \text{Earnings change}} + \underbrace{(w_1^C - w_0^C) * (\bar{Y}_1^C - \bar{Y}_0^C)}_{C: \text{Employment share change}} \\
 &+ \underbrace{w_1^N * (\bar{Y}_1^N - \bar{Y}_0^N)}_{N: \text{Earnings changes}} \\
 &- \underbrace{w_0^X * (\bar{Y}_0^X - \bar{Y}_0^X)}_{X: \text{Earnings changes}} \\
 &+ \underbrace{w_0^M * (\bar{Y}_1^M - \bar{Y}_0^M)}_{M: \text{Earnings change}} + \underbrace{(w_1^M - w_0^M) * (\bar{Y}_1^M - \bar{Y}_0^M)}_{M: \text{Employment share change}}
 \end{aligned}$$

# 1. Subgroup contributions

	Log (Earnings) ( $y_{ijt}$ )	Sex & Age ( $X'_{it}\beta$ )	Time Effects ( $\tau_t$ )	Worker Effects ( $\theta_i$ )	Firm Effects ( $\psi_j$ )
<b>1. Aggregate change</b>	0.090	0.001	0.146	<b>-0.049</b>	<b>-0.009</b>
<b>2. Worker transition group contributions</b>					
<i>Continuers</i> : Earnings	0.115	0.027	0.099	<b>-0.013</b>	0.002
Emp share	-0.015	-0.004	-0.011	<b>0.000</b>	0.000
<i>Entrants</i> : Earnings	-0.025	-0.031	0.041	<b>-0.029</b>	-0.009
<i>Exiters</i> : Earnings	0.003	0.003	0.000	<b>-0.001</b>	0.001
<i>Multi-transitions</i> : Earnings	0.010	0.006	0.017	<b>-0.005</b>	-0.002
Emp share	0.000	0.000	0.001	<b>-0.001</b>	0.000
<b>3. Firm transition group contributions</b>					
<i>Continuers</i> : Earnings	0.084	0.005	0.118	-0.040	<b>0.002</b>
Emp share	-0.003	0.000	-0.003	0.001	<b>0.000</b>
<i>Entrants</i> : Earnings	-0.002	-0.006	0.030	-0.015	<b>-0.011</b>
<i>Exiters</i> : Earnings	0.008	0.002	0.000	0.006	<b>0.000</b>
<i>Multi-transitions</i> : Earnings	0.001	0.000	0.002	0.000	<b>0.000</b>
Emp share	0.000	0.000	0.000	0.000	<b>0.000</b>

## 2. Industry contributions

- To what extent did workers (firms) enter low-earnings industries, vs have low-earnings *within* industries?
- Worker entry contribution (-0.029):
  - 60% (-0.016) is entry *into* low-earning industries
  - 40% (-0.012) is low-earnings *within* industries
- Firm entry contribution (-0.011):
  - 1/3 (-0.004) is entry *into* low-earning industries
  - 2/3 (-0.007) is low-earnings *within* industries

# Summary of main results

- Raw average FTE earnings growth: 9.0%
- Composition-adjusted growth: 14.6%
- Composition-change effects (-5.6%):
  - 4.9% decline in average worker premium
    - 60% worker entry (60% into lower wfe industries)
    - 25% continuing workers' *hours* changes
    - 15% intermittent workers' entry/*hours* changes
  - 0.9% decline in average firm premium
    - 120% firm entry (1/3 into lower ffe industries)
    - +20% from continuing firms increasing employment

# Caveat: FTE Employment ...

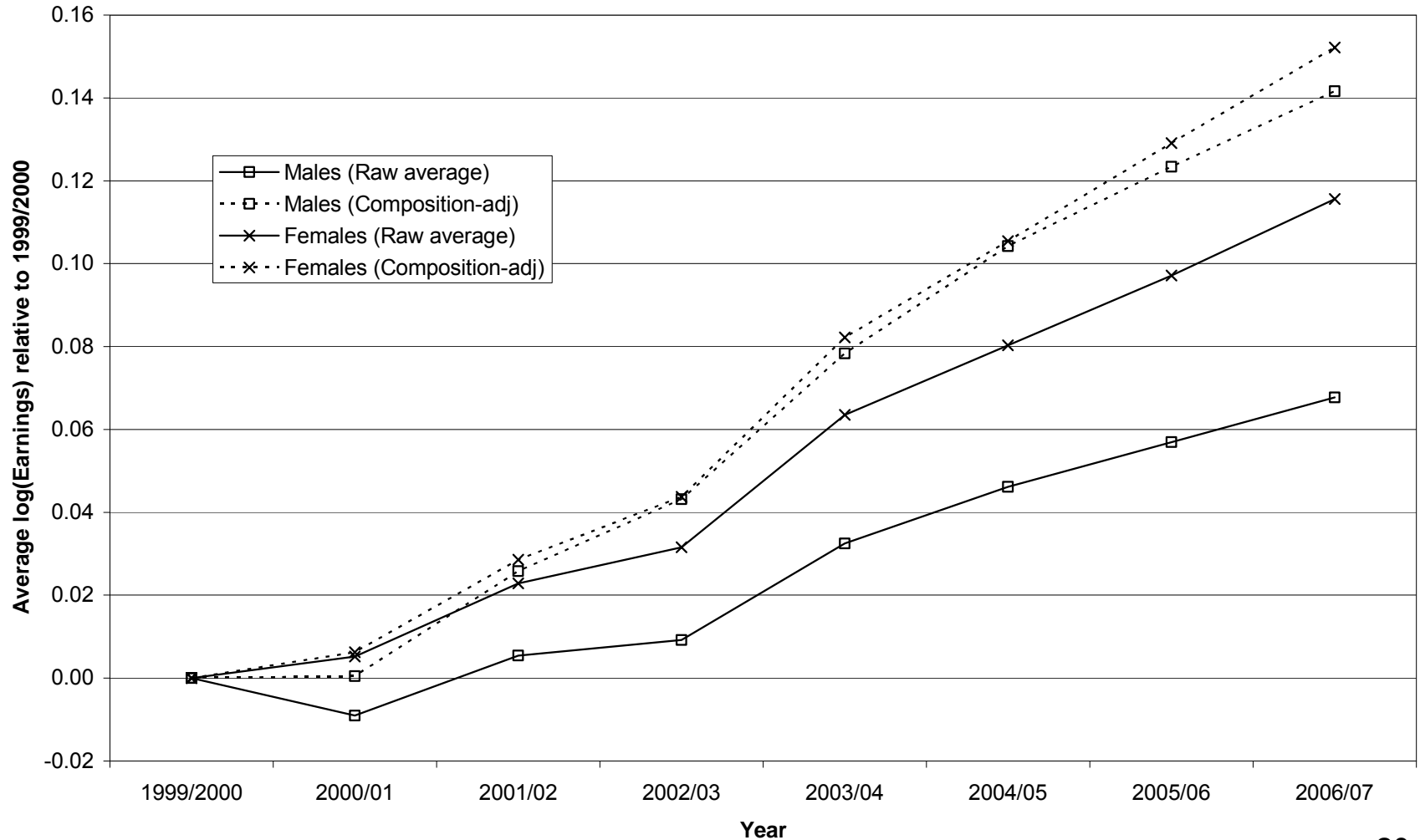
- FTE measure overstates employment of PT workers and *beneficiaries*
- Could composition impacts be biased by differential changes associated with entry / exit? E.g.
  - Entrants more likely PT than continuers?
  - But constant avg hours, so continuers hours need to increase to balance entrants

# Gender differences

- If female FTE s.t. more bias and change than male FTE, perhaps male compositional impacts more reliable ...

	<b>Males</b>	<b>Females</b>
Raw earnings growth	0.068	0.116
Adjusted earnings growth	0.142	0.152
Composition effects	<b>-0.074</b>	<b>-0.036</b>

# Annual log(earnings) growth



# Concluding comments

- Log(FTE earnings) a productivity proxy?
  - Avg log(FTE earn) growth = 1.3%
  - Composition-adj growth = 2.1% pa
  - C.f. SNZ's LP growth = 1.1% pa (2000-07)
  - Similar composition-effects on productivity?
- Similar composition-adj during 1990s?
- Similar composition effects elsewhere?
- Reverse effects in a downswing – i.e. *improved* productivity growth?