

**An Assessment of the Firm Level Impacts of  
Innovation, Export, Productivity Catch-up and Wages  
on Employment Growth in Chinese Manufacturing**  
(Work In Progress)

**By**  
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# Outline

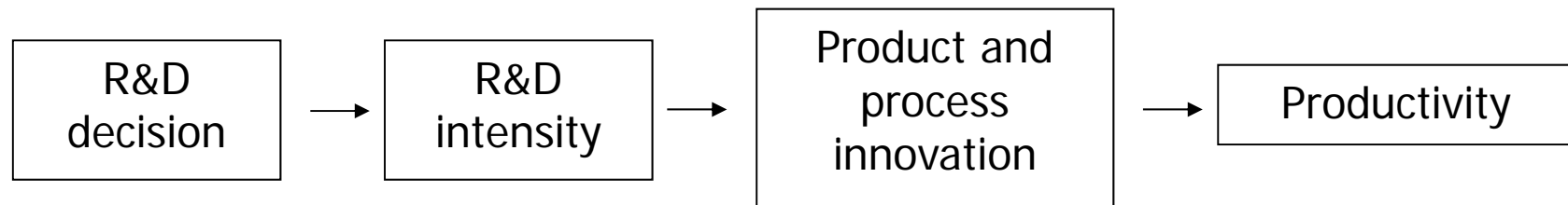
## 知其不可而为之----《论语•宪问》

Zhi qi bu ke wei er wei zhi----kong zi shuo (Analects)

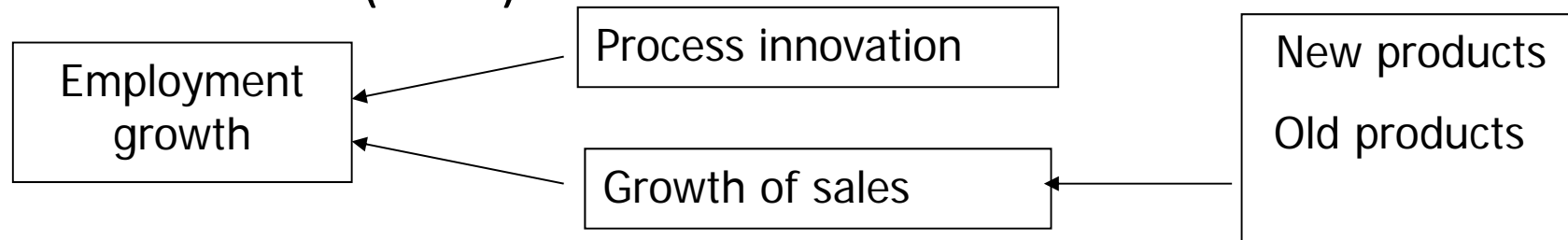
- Background and Empirical Framework
- Data and Descriptive Statistics
- Preferred Regression Results and Variants
- Employment Growth Decomposition
- Conclusion

# Background

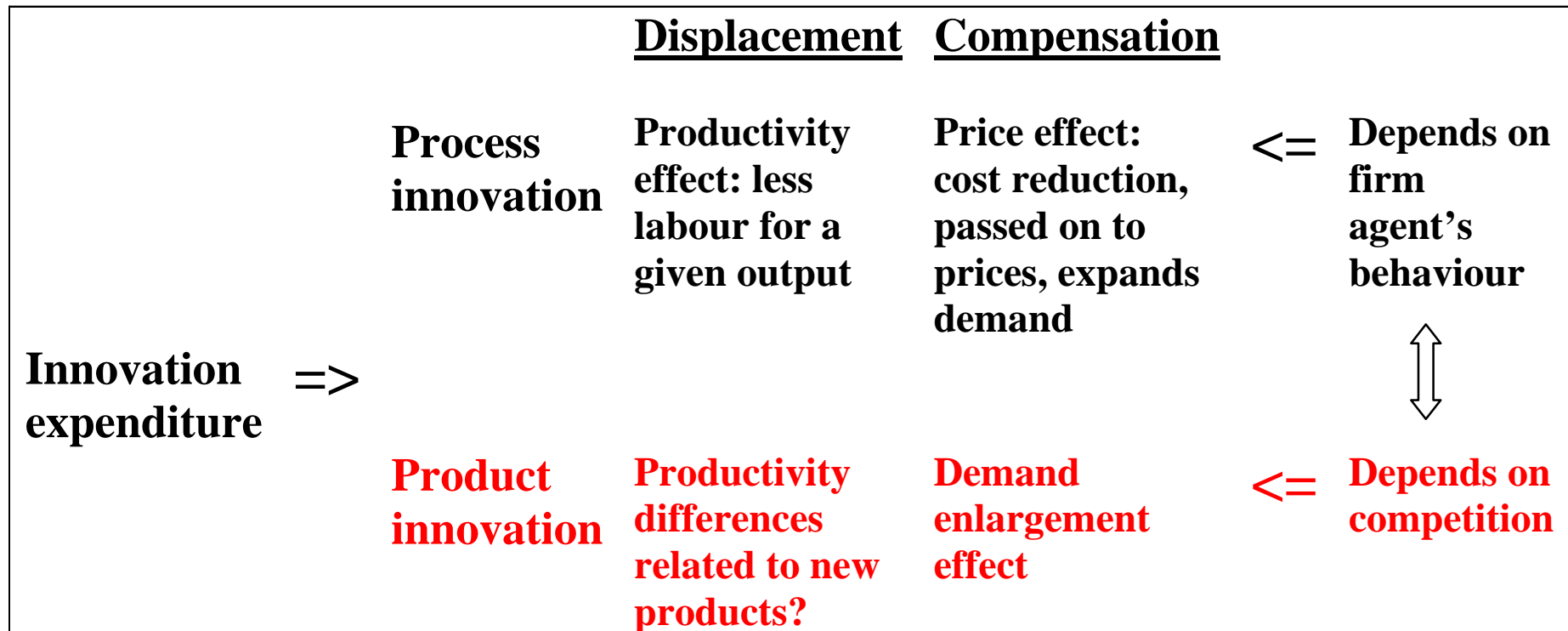
- Crépon, Duguet & Mairesse (1998); Mairesse, Mohnen & Kremp (2005); Griffith, Huergo, Mairesse & Peters (2006); Hall, Lotti & Mairesse (2009)



- Harrison, Jaumandreu, Mairesse & Peters (2005); Hall, Lotti & Mairesse (2007)



# Employment effects on innovations



# Empirical Framework : extended “Jordi model”: version (1)

$$(1) \quad gl_{it} = \alpha_0 + \beta_{do} wgqdo_{it} + \beta_{eo} wgqeo_{it} + \beta_{dn} ngqdn_{it} + \beta_{en} ngqen_{it} \\ + \sum_{k=1}^K \delta_k \text{var}(k)_{it} + \sum_{j=1}^J \alpha_{0j} \text{dum}(j)_{it} + \varepsilon_{it}$$

and  $\beta_{do} + \beta_{eo} = 1$

Where

- ***gl*** is growth rate of employment
- ***wgqdo, wgqeo, ngqdn and ngqen*** are the “***rates of growth***” of Domestic and Old products, Export and Old products, Domestic and New products, and Export and New products.
- ***Var(k)*** are four additional explanatory variables.
- ***Dum(j)*** includes five groups of dummies to control for the effect of time period, industry, region, ownership and firm scale.

## Definition of rates of growth of domestic, export, old and new product output

$$gq = (q - l.q) / l.q = wgqdo + wgqeo + ngqdn + ngqen$$

$$\text{with } wgqdo = (qdo - l.qd) / l.q = \frac{(qdo - l.qd)}{l.qd} \times \frac{l.qd}{l.q}$$

$$wgqeo = (qeo - l.qe) / l.q = \frac{(qeo - l.qe)}{l.qe} \times \frac{l.qe}{l.q}$$

$$ngqdn = qdn / l.q$$

$$ngqen = qen / l.q$$

## Definition of productivity frontier

- The frontier is defined as the p95 percentile of productivity within 2-digit (or 3-digit level) industries and five large regions .
- Where productivity is defined as

$$\text{Prod}_{it} = \ln(\text{Gross Output} / \text{Number of Employees})$$

$$\text{Dis}_{it}^{ind, reg} = p95 \text{ of } \text{Prod}_{it}^{ind, reg} - \text{Prod}_{it}$$

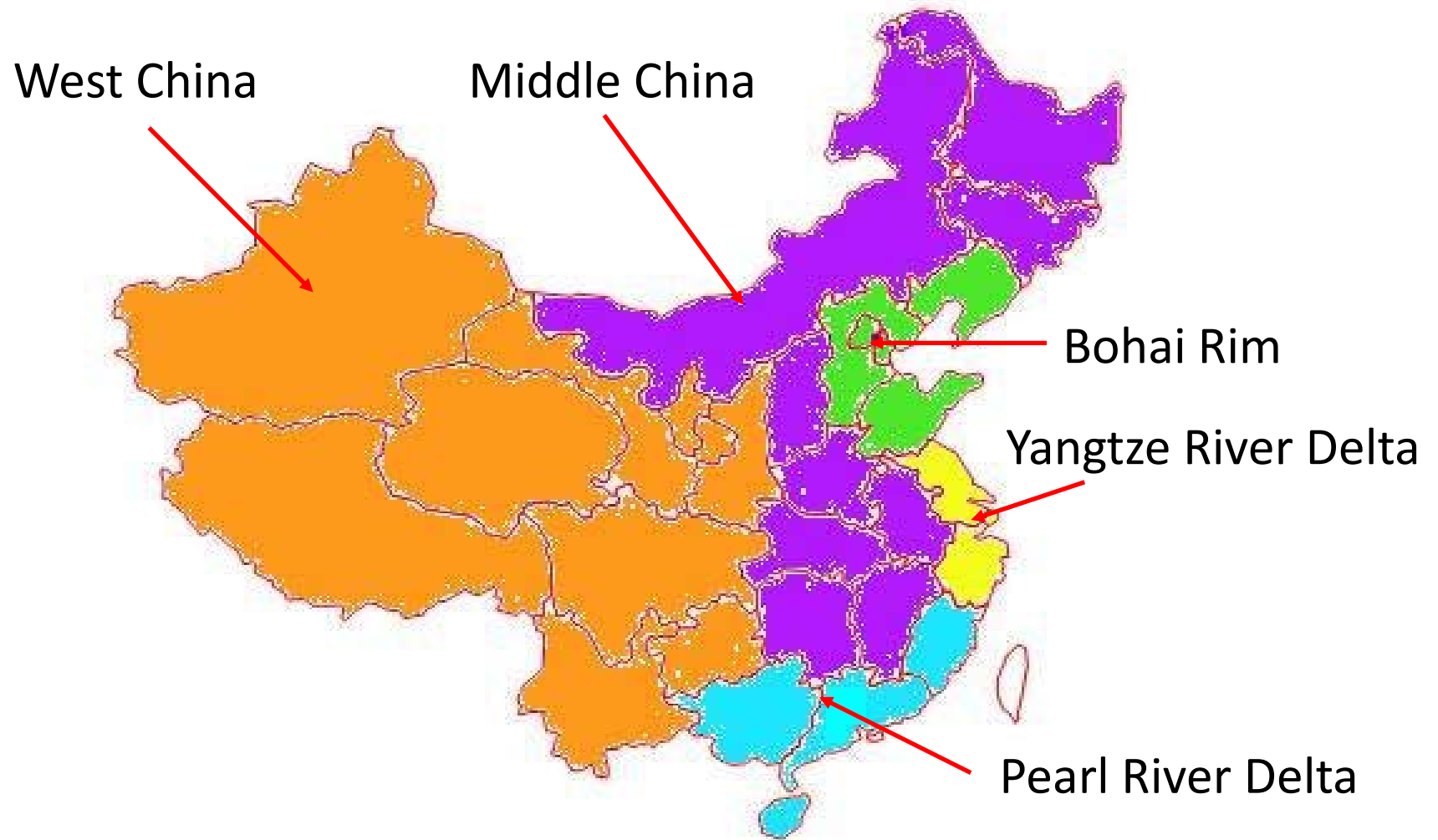
$$\text{Gfr}_t^{ind, reg} = p95 \text{ of } \text{Prod}_t^{ind, reg} - p95 \text{ of } \text{Prod}_{t-1}^{ind, reg}$$

## The five groups of dummies includes

- **6-Per** dummies for the six three-year sample periods
- **4-Ind** dummies of industries based on level of technology
- **5-Reg** dummies of the five regions of China
- **3-Own** dummies of three kinds of firm ownerships
- **3-Sca** dummies of firm size
- With in the 4 industries groups and 5 regions, we also control for the 29 2-digit manufacturing industries and 30 provinces



# The five regions of China



## Data Source

- Survey conducted by the National Bureau of Statistics
- The annual industry survey, covering (all) 29 manufacturing industries, for **all** State-owned firms, and non-state-owned firms **with sales higher than 5 million RMB Yuan** (i.e., Limited-liability, Share-holding, Private, Hong-Kong, Macao and Taiwan, Foreign)
- Allows the construction of **an unbalanced firm panel over the 8 years 1999-2006**, with usual current account and balance sheet variables, **Total Employment (EMP)**, and **New Products Output (NPV)** in all years except 2004, **R&D** expenditures (R&D) in all years 2001 -2006 except 2004, and **Export (EXP)** in all years

# Data Cleaning

- Keeping firms with:
  - Sales  $\geq$  5 million yuan and Gross output  $\geq$  5 million yuan
  - Employment  $\geq$  10
  - Wage  $\geq$  0 & Wage per capita  $\geq$  1000 yuan
  - $-0.7 < \ln(\text{growth rate of employment}) < 1$
  - $-0.7 < \ln(\text{growth rate of gross output}) < 2$
  - $-0.7 < \ln(\text{growth rate of productivity}) < 2$
  - $-0.7 < \ln(\text{growth rate of wage per capita}) < 2$
  - $-0.7 < \ln(\text{growth rate fix assets}) < 2$
- **Keeping at this stage the combination of six three years balanced samples: respectively on 1999-2001, 2000-2002, 2001-2003, 2002-2004, 2003-2005, 2004-2006.**
- **Focusing on the yearly growth rate evidence for the last two years of each periods.**

# Numbers of firms in different periods

Time Period	Numbers of firms
1999-2001	47531
2000-2002	36831
2001-2003	39628
2002-2004	43083
2003-2005	50537
2004-2006	52193

**\*The total number of observations is 269803, when pooling these six samples**

# Descriptive statistics of main variables

	Employment Growth	Old and domestic product growth	Old and export product growth	New and domestic product growth	New and export product growth
<b>mean</b>	<b>2.4%</b>	<b>9.9%</b>	<b>2.2%</b>	<b>4.1%</b>	<b>1.1%</b>
<b>sd</b>	<b>0.22</b>	<b>0.42</b>	<b>0.25</b>	<b>0.17</b>	<b>0.08</b>
<b>p5</b>	<b>-29.1%</b>	<b>-42.9%</b>	<b>-24.9%</b>	<b>0.0%</b>	<b>0.0%</b>
<b>p25</b>	<b>-6.9%</b>	<b>-8.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>
<b>p50</b>	<b>0.0%</b>	<b>2.9%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>
<b>p75</b>	<b>7.9%</b>	<b>23.1%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>
<b>p95</b>	<b>42.5%</b>	<b>78.3%</b>	<b>37.7%</b>	<b>28.2%</b>	<b>1.2%</b>

# Descriptive statistics of four types of firms

	Firms	Percentage	Employment Growth	Productivity Growth	New Product %	Export %
none, none	153842	57.0%	1.3%	18.4%	0.0%	0.0%
NPV, none	15833	5.9%	1.5%	19.5%	34.7%	0.0%
none, EXP	81818	30.3%	4.2%	14.6%	0.0%	64.9%
NPV, EXP	18310	6.8%	3.5%	18.5%	34.4%	36.0%
<b>Total</b>	<b>269803</b>	<b>100.0%</b>	<b>2.4%</b>	<b>17.3%</b>	<b>4.4%</b>	<b>22.1%</b>

# Descriptive statistics of other model variables

Stats	Emplo- yees	Emple- yees Growth	Produc- tivity Growth	Wage Growth	Fixed Assets	Fixed Assets Growth	Distance to frontier (2d)	Frontier Growth (2d)	Distance to frontier (3d)	Frontier Growth (3d)
<b>mean</b>	<b>444</b>	<b>2.4%</b>	<b>17.3%</b>	<b>15.9%</b>	<b>56197</b>	<b>6.8%</b>	<b>1.48</b>	<b>0.11</b>	<b>1.42</b>	<b>0.11</b>
<b>sd</b>	<b>1500</b>	<b>21.9%</b>	<b>40.5%</b>	<b>45.0%</b>	<b>532768</b>	<b>32.7%</b>	<b>0.87</b>	<b>0.17</b>	<b>0.86</b>	<b>0.26</b>
<b>p05</b>	<b>40</b>	<b>-29.1%</b>	<b>-30.8%</b>	<b>-30.4%</b>	<b>830</b>	<b>-29.4%</b>	<b>0.00</b>	<b>-0.12</b>	<b>0.00</b>	<b>-0.27</b>
<b>p25</b>	<b>94</b>	<b>-6.9%</b>	<b>-6.3%</b>	<b>-6.0%</b>	<b>3134</b>	<b>-9.1%</b>	<b>0.93</b>	<b>0.03</b>	<b>0.86</b>	<b>0.00</b>
<b>p50</b>	<b>183</b>	<b>0.0%</b>	<b>10.5%</b>	<b>7.2%</b>	<b>8330</b>	<b>-0.6%</b>	<b>1.51</b>	<b>0.11</b>	<b>1.43</b>	<b>0.11</b>
<b>p75</b>	<b>396</b>	<b>7.9%</b>	<b>31.4%</b>	<b>25.9%</b>	<b>25544</b>	<b>14.3%</b>	<b>2.06</b>	<b>0.19</b>	<b>1.98</b>	<b>0.23</b>
<b>p95</b>	<b>1458</b>	<b>42.5%</b>	<b>86.0%</b>	<b>85.9%</b>	<b>158541</b>	<b>70.5%</b>	<b>2.86</b>	<b>0.34</b>	<b>2.81</b>	<b>0.47</b>

## Variants of specification (1)

- (1)  $\beta_{do} = \beta_{eo} = \beta_{dn} = \beta_{en} = 1$
- (2)  $\beta_{do} = \beta_{eo} = 1 \quad \beta_{dn} = \beta_{en} \neq 0$
- (3)  $\beta_{do} = \beta_{dn} \neq 0 \quad \beta_{eo} = \beta_{en} \neq 0$  and  $\beta_{do} + \beta_{eo} = 1$
- (4)  $\beta_{do} \neq \beta_{eo} \neq \beta_{dn} \neq \beta_{en} \neq 0$  and  $\beta_{do} + \beta_{eo} = 1$
- (5)  $\beta_{do} \neq \beta_{eo} \neq \beta_{dn} \neq \beta_{en} \neq 0$  and  $\beta_{do} + \beta_{eo} = 1$  with grw and gfa
- (6)  $\beta_{do} \neq \beta_{eo} \neq \beta_{dn} \neq \beta_{en} \neq 0$  and  $\beta_{do} + \beta_{eo} = 1$  with grw, gfa, dis and gfr  
calculate in two digit industry
- (7)  $\beta_{do} \neq \beta_{eo} \neq \beta_{dn} \neq \beta_{en} \neq 0$  and  $\beta_{do} + \beta_{eo} = 1$  with grw, gfa, dis and gfr  
calculate in three digit industry



# Results for Variants of Specification (1)

Coef.	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
grq	=0	=0	=0	=0	=0	=0	=0
wgrqdo	=1	=1	0.359	0.359	0.363	0.362	0.363
wgrqeo	=1	=1	0.641	0.641	0.637	0.638	0.637
ngrqdn	=1	0.828	0.359	0.322	0.329	0.315	0.318
ngrqen	=1	0.828	0.641	0.522	0.523	0.514	0.513
grw					-0.108	-0.109	-0.109
gfa					0.024	0.017	0.017
dis						-0.043	-0.042
gfr						-0.033	-0.029
_cons	-0.136	-0.119	-0.035	-0.030	-0.016	0.057	0.050
Number of obs	269803	269803	269803	269803	269803	269803	269803
Root MSE	0.4037	0.4024	0.2412	0.2409	0.2359	0.2333	0.2335
5 Groups Dummy	√	√	√	√	√	√	√

## Variants of specification (2)

- (1)  $\gamma_{do} = \gamma_{eo} = \gamma_{dn} = \gamma_{en} = 0$
- (2)  $\gamma_{do} = \gamma_{eo} = 0$     $\gamma_{dn} = \gamma_{en} \neq 0$
- (3)  $\gamma_{do} = \gamma_{dn} \neq 0$     $\gamma_{eo} = \gamma_{en} \neq 0$  and  $\gamma_{do} + \gamma_{eo} = -1$
- (4)  $\gamma_{do} \neq \gamma_{eo} \neq \gamma_{dn} \neq \gamma_{en} \neq 0$  and  $\gamma_{do} + \gamma_{eo} = -1$
- (5)  $\gamma_{do} \neq \gamma_{eo} \neq \gamma_{dn} \neq \gamma_{en} \neq 0$  and  $\gamma_{do} + \gamma_{eo} = -1$  with grw and gfa
- (6)  $\gamma_{do} \neq \gamma_{eo} \neq \gamma_{dn} \neq \gamma_{en} \neq 0$  and  $\gamma_{do} + \gamma_{eo} = -1$  with grw, gfa, dis and gfr  
calculate in two digit industry
- (7)  $\gamma_{do} \neq \gamma_{eo} \neq \gamma_{dn} \neq \gamma_{en} \neq 0$  and  $\gamma_{do} + \gamma_{eo} = -1$  with grw, gfa, dis and gfr  
calculate in three digit industry

# Results for Variants of Specification (2)

Coef.	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
grq	=1	=1	=1	=1	=1	=1	=1
wgrqdo		=0	-0.641	-0.641	-0.637	-0.638	-0.637
wgrqeo		=0	-0.359	-0.359	-0.363	-0.362	-0.363
ngrqdn		-0.172	-0.641	-0.678	-0.671	-0.685	-0.682
ngrqen		-0.172	-0.359	-0.478	-0.477	-0.486	-0.487
grw					-0.108	-0.109	-0.109
gfa					0.024	0.017	0.017
dis						-0.043	-0.042
gfr						-0.033	-0.029
_cons	-0.136	-0.119	-0.035	-0.030	-0.016	0.057	0.050
Number of obs	269803	269803	269803	269803	269803	269803	269803
Root MSE	0.4037	0.4024	0.2412	0.2409	0.2359	0.2333	0.2335
5 Groups Dummy	✓	✓	✓	✓	✓	✓	✓

# Results for IV regression

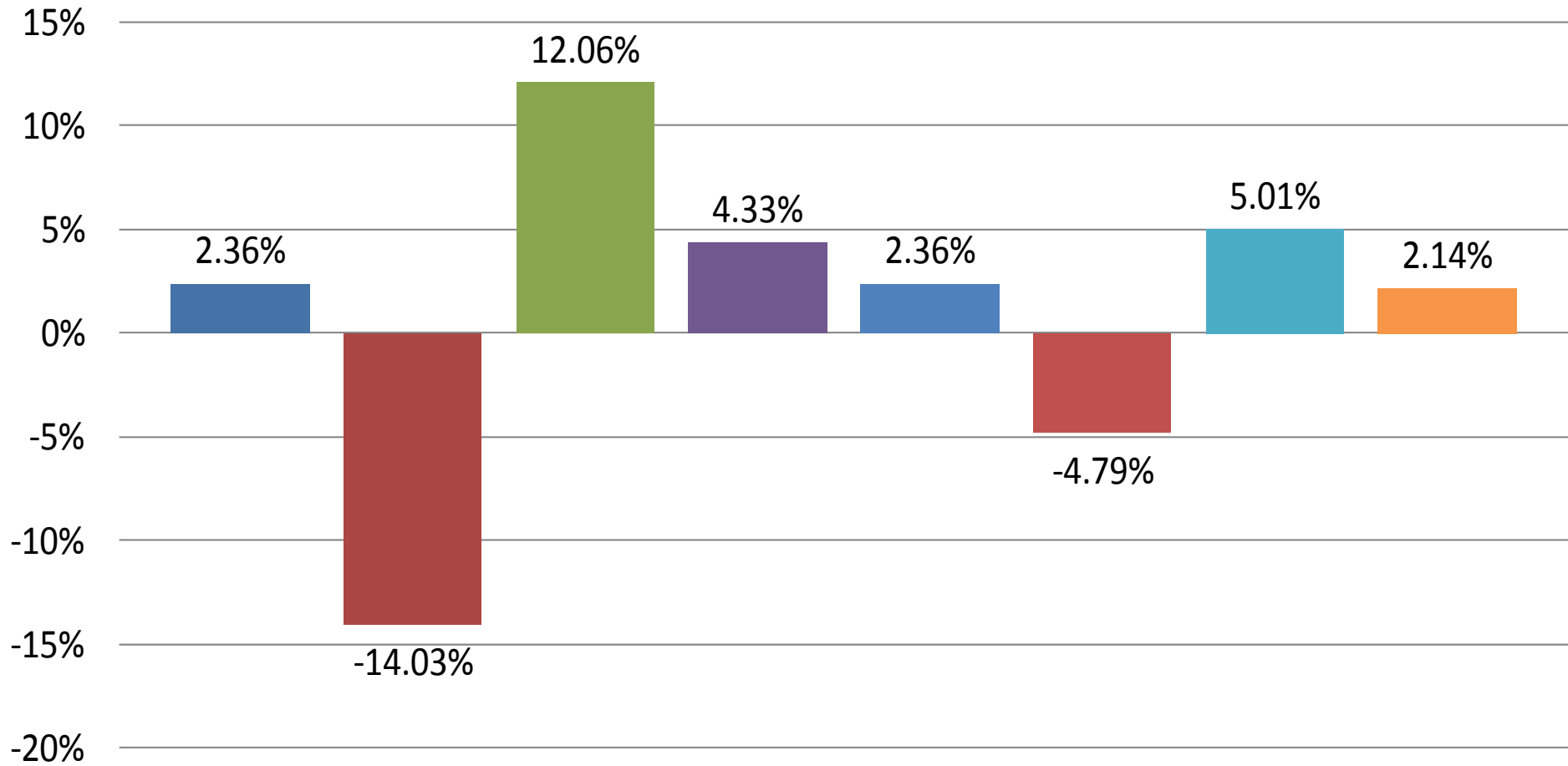
Model	OLS	IV	OLS	IV
Constraint	wrqdo+wrqde=1		No constraint	
wgrqdo	0.362*** (0.001)	0.490*** (0.009)	0.150*** (0.001)	0.586*** (0.075)
wgrqeo	0.638*** (0.001)	0.510*** (0.009)	0.182*** (0.002)	0.578*** (0.087)
ngrqdn	0.315*** (0.003)	0.383*** (0.018)	0.136*** (0.003)	0.452*** (0.07)
ngrqen	0.514*** (0.005)	0.489*** (0.032)	0.19*** (0.005)	0.587*** (0.101)
grw	-0.109*** (0.001)	-0.117*** (0.002)	-0.084*** (0.001)	-0.125*** (0.008)
gfa	0.017*** (0.001)	0.008*** (0.002)	0.046*** (0.001)	-0.001*** (0.009)
dis	-0.043*** (0.001)	-0.043*** (0.001)	-0.039*** (0.000)	-0.043*** (0.001)
gfr	-0.033*** (0.003)	-0.037*** (0.003)	-0.02*** (0.003)	-0.041*** (0.005)
_cons	0.057*** (0.002)	-0.01*** (0.007)	0.083*** (0.001)	-0.015*** (0.009)
5 Groups Dummy	√	√	√	√
Number of obs	269803	269803	269803	269803
Root MSE	0.2333	.24525	0.2009	.2643
Instrumented variables	wgrqdo wgrqeo grqdn grqen			
IV variables	11br 12br 11be 12be 11bre 12bre 12lp			
First Stage Robust F:	F(7,269724)		F(7,269724)	
wgrqdo or Wgrqdif	--	291.559	--	363.829
wgrqeo	--	-	--	221.132
ngrqdn	--	597.891	--	597.891
ngrqen	--	526.691	--	526.691
Sargan's (1958) and Basman's (1960) tests of overidentification: P value	--	0.000	--	0.000
Wooldridge (1995) Endogeneity Test: P value	--	0.000	--	0.000

# Employment Growth Decomposition

$$\begin{aligned}
 gl = & \underbrace{I(wgrqdo > 0)\hat{\beta}_{do}wgrqdo + I(wgrqeo > 0)\hat{\beta}_{eo}wgrqeo}_{\text{Growth due to the four kinds of products}} \\
 & + \underbrace{I(ngrqdn > 0)\hat{\beta}_{dn}ngrqdn + I(ngrqen > 0)\hat{\beta}_{en}ngrqen}_{\text{Growth due to the four kinds of products}} \\
 & + \delta_1 gw + \delta_2 gfa + \delta_3 dis + \delta_4 gfr \\
 & + \underbrace{\hat{\alpha}_0 + \sum_j \hat{\alpha}_{0j} reg_j + \sum_k \hat{\alpha}_{0k} own_k + \sum_l \hat{\alpha}_{0l} ind_l + \sum_m \hat{\alpha}_{0m} sca_m + \sum_p \hat{\alpha}_{0p} per_p + \hat{v}}_{\text{Residual Productivity trend}}
 \end{aligned}$$

Growth due to wage, fixed asset, distance to frontier and growth of frontier

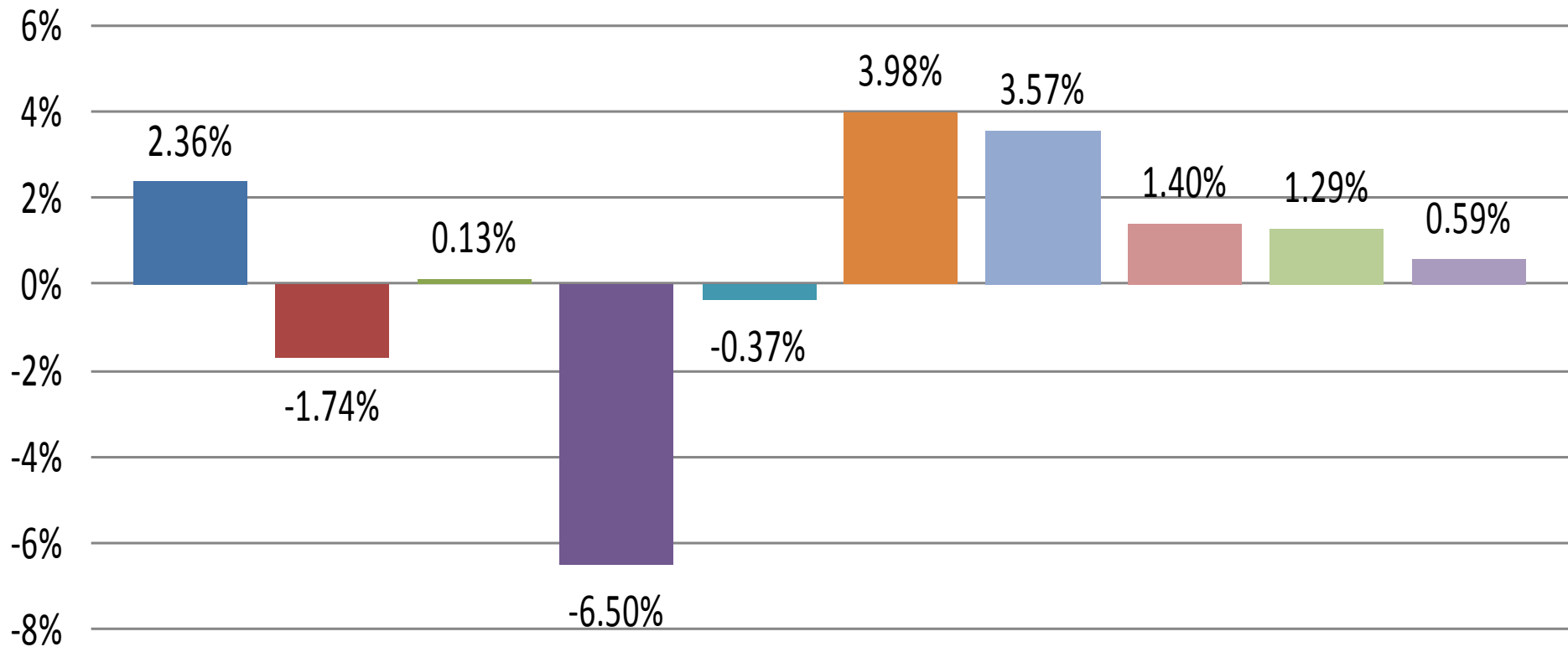
# Employment Growth Decomposition base on Model 2 and 3 in Variants of Specification (1)



- Employment Growth
- Old
- Employment Growth
- Domestic
- Residual Productivity trend
- New
- Residual Productivity trend
- Export

# Employment Growth Decomposition base on Model 6 23

## (2 digit industry)



■ Employment Growth

■ Wage

■ Growth of Fixed Assets

■ Lag distance to frontier(t-2)

■ Growth of frontier

■ Residual Productivity trend

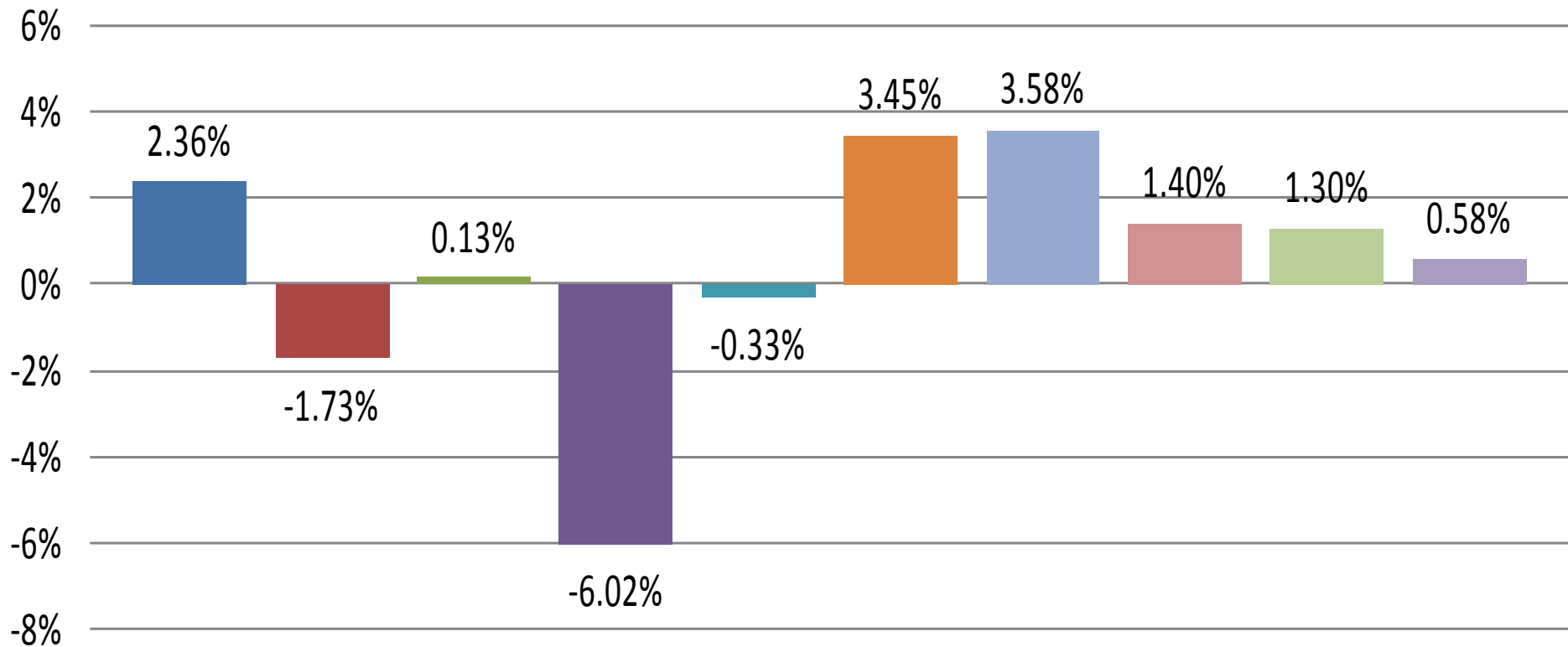
■ Domestic old

■ Domestic new

■ Export old

■ Export new

# Employment Growth Decomposition base on Model 6 24 (3 digit industry)



■ Employment Growth

■ Wage

■ Growth of Fixed Assets

■ Lag distance to frontier(t-2)

■ Growth of frontier

■ Residual Productivity trend

■ Domestic old

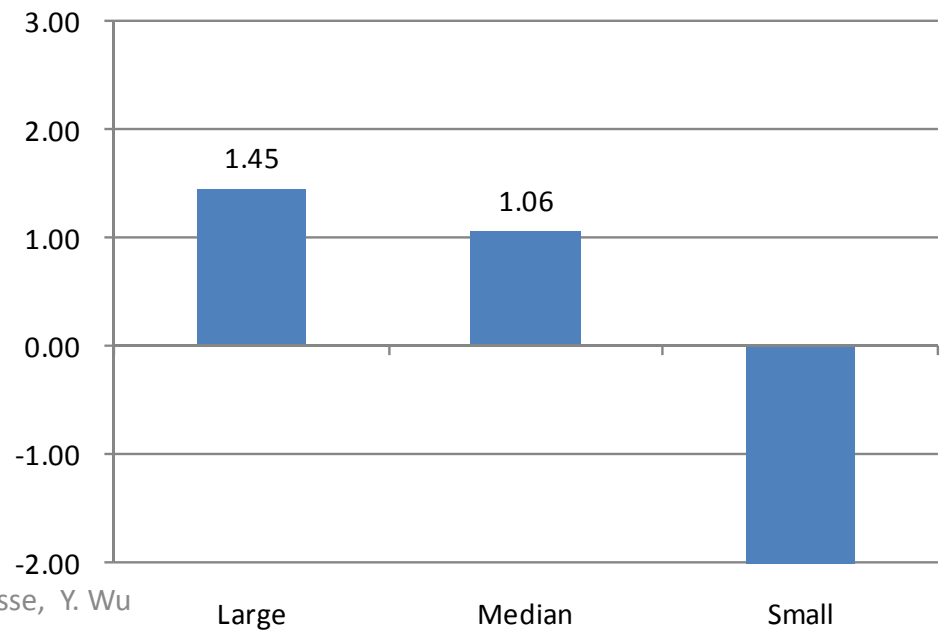
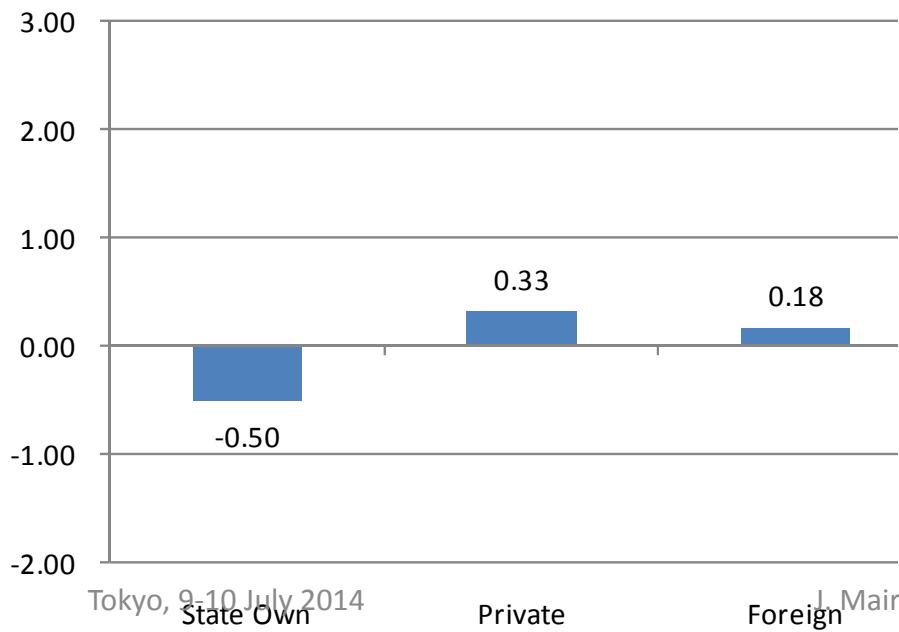
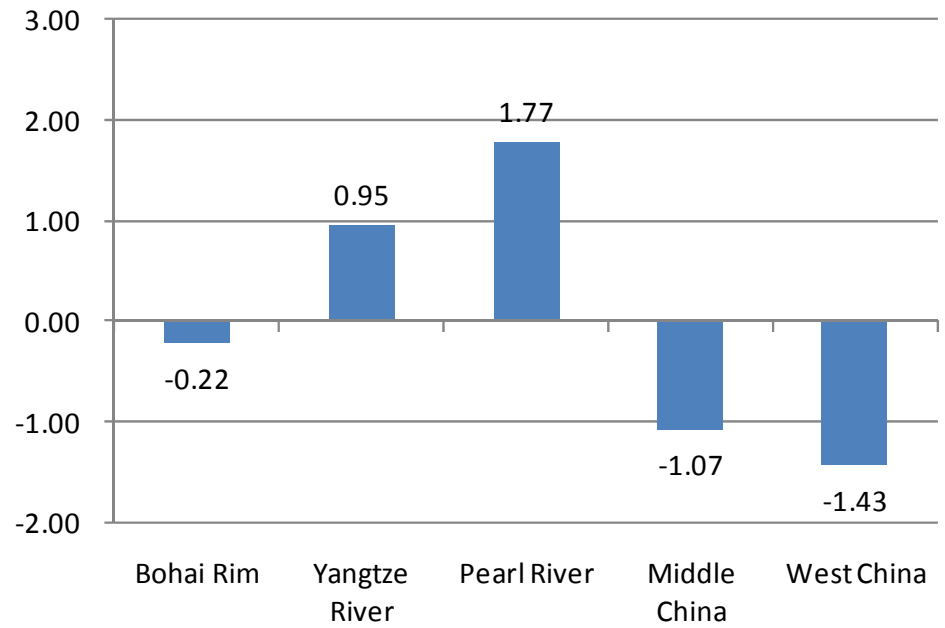
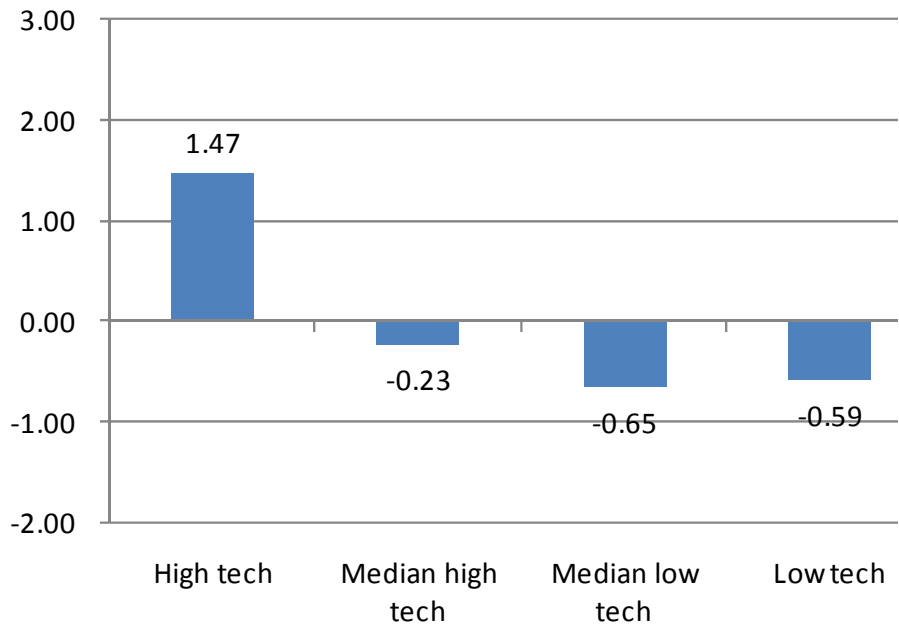
■ Domestic new

■ Export old

■ Export new



# Employment Growth Effects for Different Groups



Tokyo, 9-10 July 2014

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# Employment Growth Decomposition for Different Ownerships

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%	Employment Growth	Wage	Growth of Fixed Assets	Lag distance to frontier (t-2)	Growth of frontier	Domestic old	Domestic new	Export old	Export new	Residual Productivity trend	Num. of Obs
Descriptive Statistics											
State Own	0.13	15.13	6.25	162.96	11.74	8.65	0.50	5.31	0.83	-	46.21
Private	3.87	18.18	13.16	148.08	12.81	15.82	2.34	3.14	1.04	-	26.14
Foreign	4.65	15.12	4.75	131.67	7.99	6.25	4.91	2.95	1.74	-	27.66
Decomposition base on whole sample model											
State Own	0.13	-1.65	0.11	-7.04	-0.39	3.13	0.32	1.67	0.43	3.56	46.21
Private	3.87	-1.98	0.22	-6.40	-0.43	5.73	1.49	0.99	0.53	3.71	26.14
Foreign	4.65	-1.65	0.08	-5.69	-0.27	2.27	3.13	0.93	0.90	4.96	27.66
Decomposition base on separate sub ownership samples models											
State Own	0.13	-1.56	0.16	-6.56	-0.30	2.33	0.37	1.28	0.45	3.97	46.21
Private	3.87	-1.72	0.16	-7.64	-0.61	5.28	1.56	1.00	0.53	5.31	26.14
Foreign	4.65	-1.83	0.10	-5.11	-0.24	2.98	2.57	1.12	0.81	4.26	27.66
Total	2.36	-1.74	0.13	-6.50	-0.37	3.57	1.40	1.29	0.59	3.98	100.00

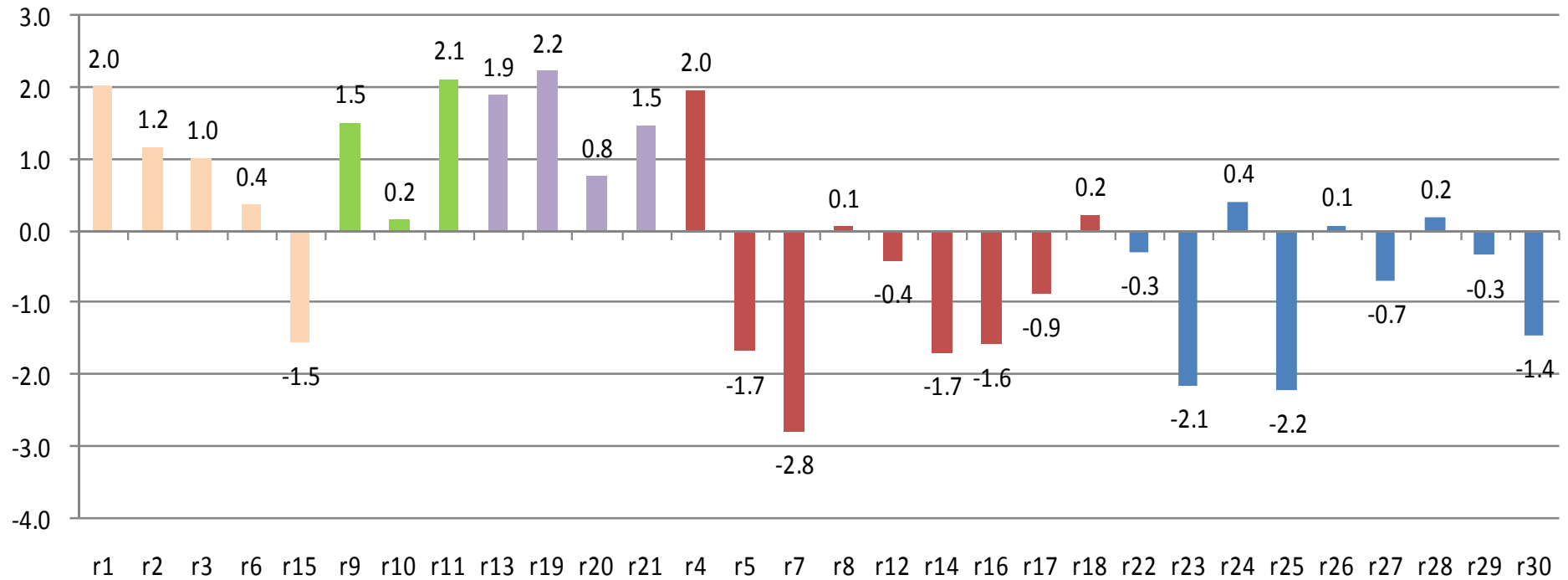
Tokyo, 9-10 July 2014

J. Mairesse, Y. Wu

# Employment Growth Decomposition for Different Regions

%	Employment Growth	Wage	Growth of Fixed Assets	Lag distance to frontier (t-2)	Growth of frontier	Domestic old	Domestic new	Export old	Export new	Residual Productivity trend	Num. of Obs
Descriptive Statistics											
Bohai Rim	1.76	18.28	8.01	167.19	12.91	12.77	1.91	4.71	0.94	-	20.22
Yangtze River Delta	3.09	13.43	9.13	142.94	9.76	8.27	2.23	4.26	1.63	-	38.05
Pearl River Delta	3.84	17.31	4.98	155.21	4.95	7.64	4.48	1.90	1.16	-	18.71
Middle China	0.85	17.21	7.94	147.62	16.03	13.08	0.78	4.32	0.47	-	14.38
West China	-0.12	16.29	5.52	138.39	16.53	9.47	0.21	6.28	0.48	-	8.64
Decomposition base on whole sample model											
Bohai Rim	1.76	-1.99	0.14	-7.22	-0.43	4.63	1.22	1.48	0.48	3.46	20.22
Yangtze River Delta	3.09	-1.46	0.16	-6.18	-0.33	3.00	1.42	1.34	0.84	4.30	38.05
Pearl River Delta	3.84	-1.89	0.08	-6.71	-0.17	2.77	2.85	0.60	0.60	5.69	18.71
Middle China	0.85	-1.88	0.14	-6.38	-0.54	4.74	0.50	1.36	0.24	2.66	14.38
West China	-0.12	-1.78	0.09	-5.98	-0.55	3.43	0.13	1.97	0.25	2.31	8.64
Total	2.36	-1.74	0.13	-6.50	-0.37	3.57	1.40	1.29	0.59	3.98	100.00

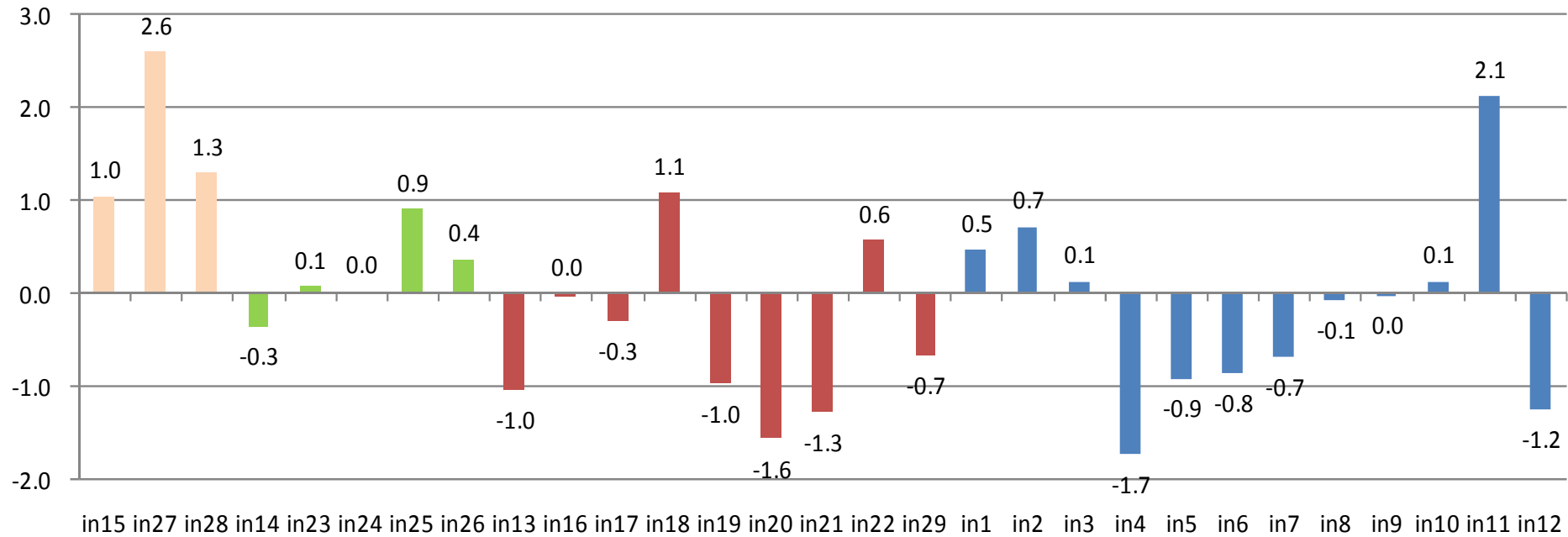
# Employment Growth Effects for Different Regions



# Employment Growth Decomposition for Different Industries

%	Employment Growth	Wage	Growth of Fixed Assets	Lag distance to frontier (t-2)	Growth of frontier	Domestic old	Domestic new	Export old	Export new	Residual Productivity trend	Num. of Obs
Descriptive Statistics											
High-tech	3.77	14.78	10.13	174.46	7.23	1.89	1.98	9.89	3.03	-	7.31
Medium-high-tech	2.76	15.96	8.45	153.19	12.23	10.20	1.54	6.75	1.23	-	31.19
Medium-low-tech	1.93	16.28	6.82	150.17	13.08	12.05	2.20	2.54	0.88	-	27.64
Low-tech	2.04	15.86	7.04	142.88	8.92	9.47	2.86	1.65	0.85	-	33.86
Decomposition base on whole sample model											
High-tech	3.77	-1.61	0.17	-7.54	-0.24	0.69	1.26	3.11	1.56	6.37	7.31
Medium-high-tech	2.76	-1.74	0.14	-6.62	-0.41	3.70	0.98	2.12	0.63	3.94	31.19
Medium-low-tech	1.93	-1.77	0.12	-6.49	-0.44	4.37	1.40	0.80	0.45	3.49	27.64
Low-tech	2.04	-1.73	0.12	-6.17	-0.30	3.43	1.82	0.52	0.44	3.91	33.86
Total	2.36	-1.74	0.13	-6.50	-0.37	3.57	1.40	1.29	0.59	3.98	100.00

# Employment Growth Effects for Different Industries



# Employment Growth Decomposition for Different size groups

%	Employment Growth	Wage	Growth of Fixed Assets	Lag distance to frontier (t-2)	Growth of frontier	Domestic old	Domestic new	Export old	Export new	Residual Productivity trend	Num. of Obs
Descriptive Statistics											
Large	5.44	13.37	10.06	151.51	11.24	1.49	1.63	12.88	3.19	-	3.29
Medium	4.39	14.22	8.44	170.63	10.45	6.68	3.11	5.94	1.85	-	29.91
Small	1.30	16.82	7.17	141.31	11.21	11.69	1.82	2.83	0.72	-	66.80
Decomposition base on whole sample model											
Large	5.44	-1.46	0.17	-6.55	-0.38	0.54	1.04	4.05	1.64	6.38	3.29
Medium	4.39	-1.55	0.14	-7.37	-0.35	2.42	1.98	1.87	0.95	6.30	29.91
Small	1.30	-1.83	0.12	-6.11	-0.38	4.24	1.16	0.89	0.37	2.83	66.80
Total	2.36	-1.74	0.13	-6.50	-0.37	3.37	1.40	1.29	0.59	3.98	100.00

# Conclusions

- The growth of output for the domestic market plays a major role for employment growth (5%), about more than 2 times larger than for exports (2%)
- Innovation has a positive effect on employment growth, but a modest one: 2% (1.4% for the domestic market , 0.6% for export)
- The growth of wage has a significant negative effect (-1.7%) while growth of fixed assets has negligible effect
- Catching up to the productivity frontier (possibly) corresponding to process and organizational innovation has to the largest effect (-6.5%)
- As reflected in the residual productivity trend, it appears that the average employment growth could have been negative of about -1.6%, and labor product higher by 1.6%.