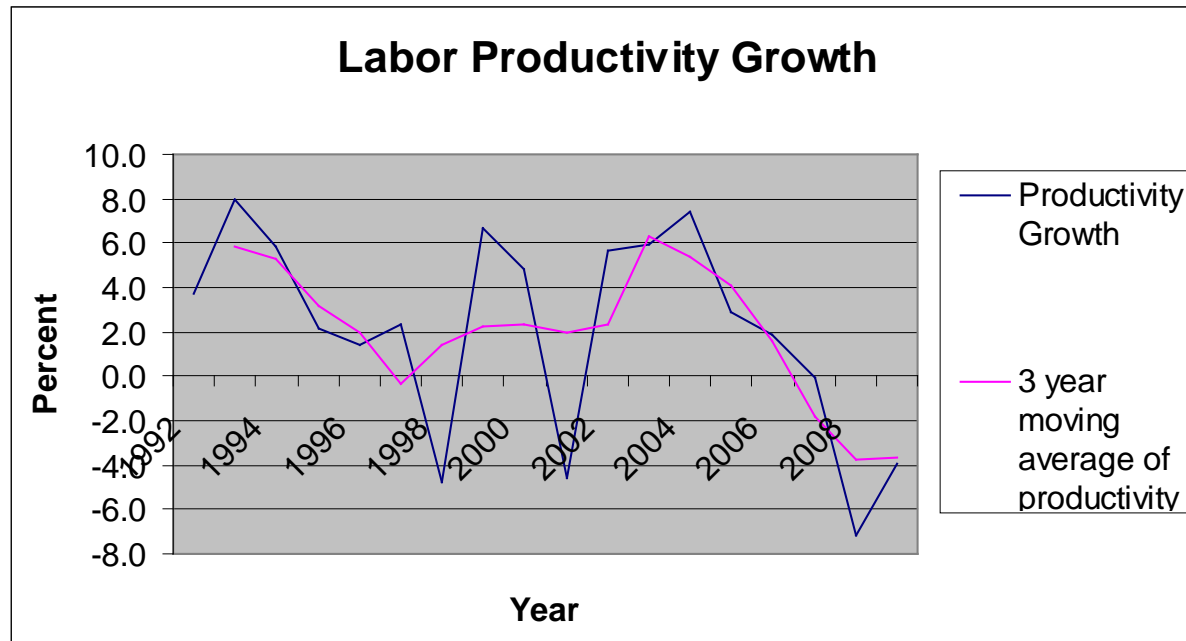


Microeconomic Approaches to Improving Productivity

Edward P. Lazear
Stanford University

Singapore Basic Facts

	2006	2007	2008	2009	2010 Q1
GDP Change	8.6	8.5	1.8	-1.3	
Employment change	176,000	234,900	221,600	37,600	
Unemployment rate	2.7	2.1	2.2	3.0	
Labor force	2594	2750	2939	3030	
Average Monthly Wages			3977	3872	4310

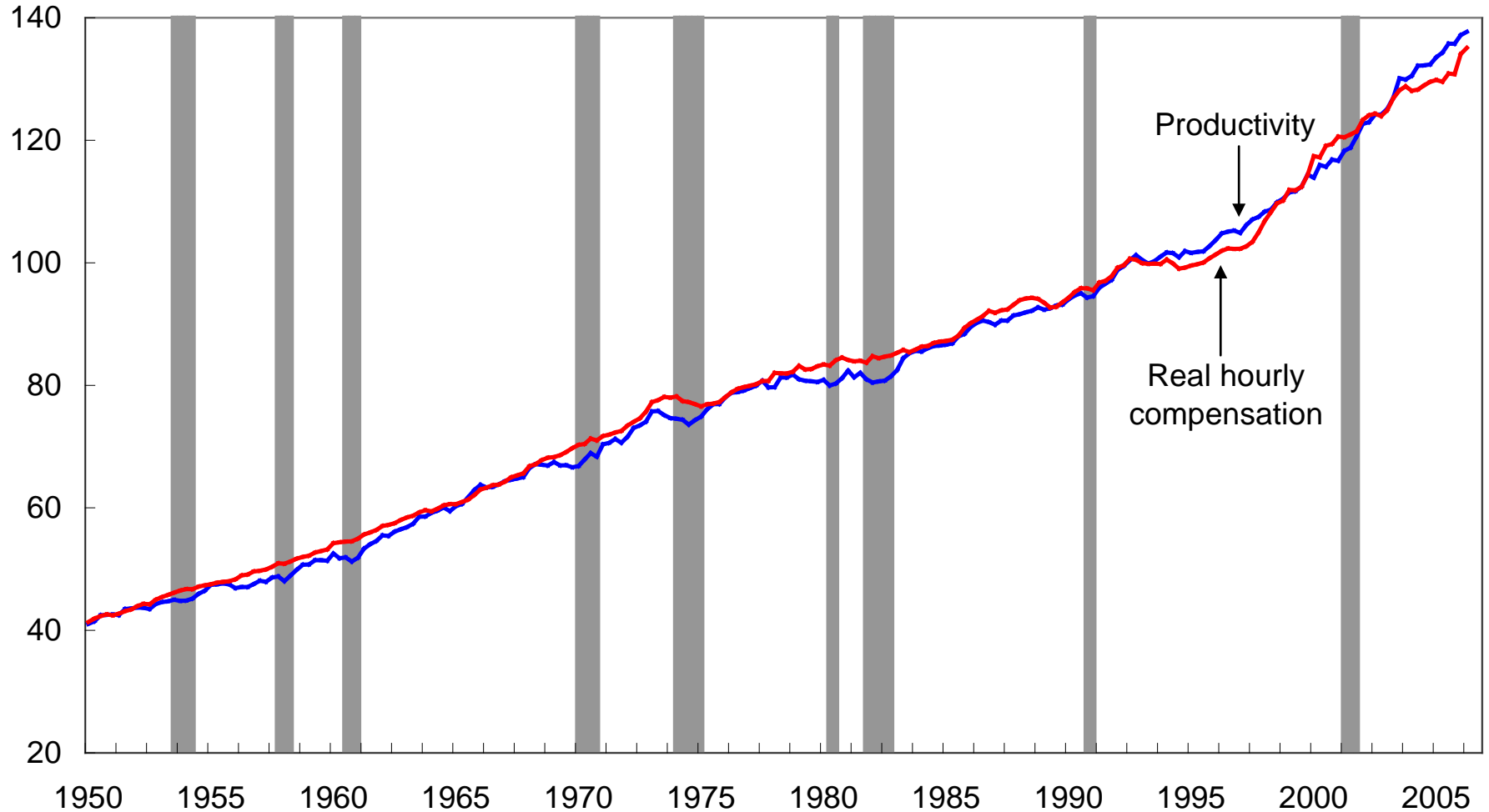


Productivity

- Much of personnel economics is about productivity
- Worker satisfaction and productivity are closely linked

Productivity and Real Compensation Grow Together

Index 1992=100



Note: These data cover all persons (including supervisory and proprietors) in the nonfarm business sector. The real product wage is hourly compensation deflated by the price index for nonfarm output. Shaded areas denote recessions.
Source: Bureau of Labor Statistics.

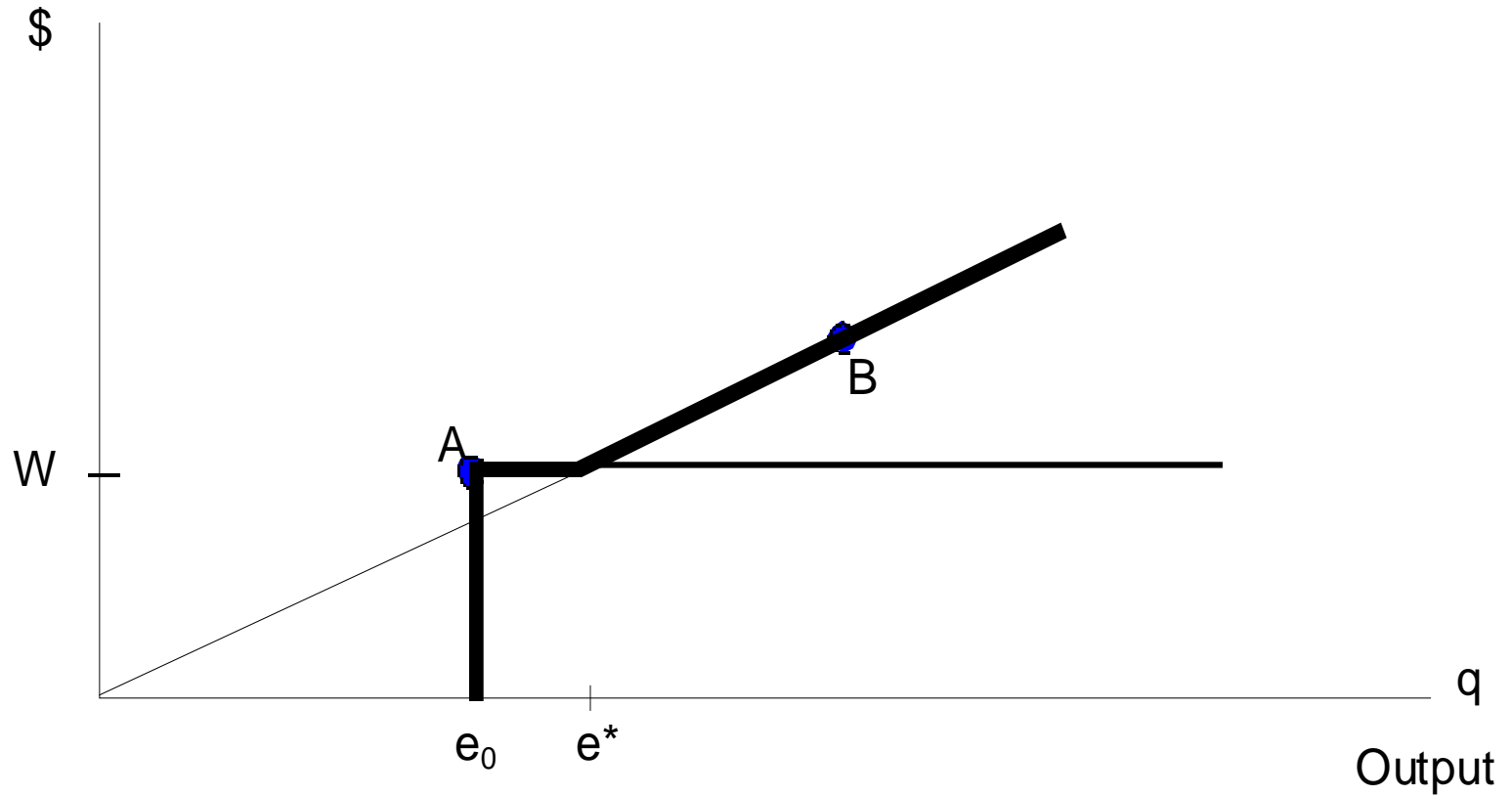
Some Examples from Personnel Economics

- Compensation
 - Piece rate pay
 - Promotions as motivators
- Practices: Modern Human Resource Management
- Newer areas: Leadership

A Simple Piece Rate Example: Safelite

- Windshield company
- Changed from hourly wages to piece rate pay
- Data on individuals
- Effects are large: 44% increase in productivity
 - Half incentives
 - Half sorting

Safelite: Before and After



Regression Results

Dependent variable = log (units per day)

Reg. #	PPPFLAG	TENUR	PPP*TENUR	NewRegime	R-square	Dummies
1	.36 (.01)				.04	Month, year
2	.20 (.01)				.73	Month, year, individual
3	.31 (.01)	.34 (.02)	.11 (.02)		.05	Month, year
4	.31 (.01)	.42 (.02)	.13 (.02)	.24 (.03)	.06	Month, year

The Lessons From Safelite

- Pay choice matters greatly
- Sorting is as important as incentives
- At country level, sorting is not helpful
 - Selection of immigrants can have effect
 - Native population receives much of surplus from immigration
 - Land
 - Capital
 - Not substitute labor
- Emphasize measurement and incentive pay

Incentive Pay is Rare: Why?

- Hurts quality
 - Pay for high quality; punish low quality
 - Safelite – rework was unpaid
- Best used when output is easily observed
 - Less applicable to managerial positions
 - Less applicable in services (8/10 of economy)
- Output-based pay is more likely when cost of measuring output is low
- As measurement becomes less costly, more variance in pay

Tournaments

- Prizes fixed in advance
- Depend on relative performance
- More spread means more effort
- Too much spread hurts recruiting

Fits the Rhetoric of Business

- When Immelt succeeded Jack Welch as CEO of GE, his salary jumped from \$1m to \$2.75m
- Nardelli, who went to Home Depot (then Chrysler) after Immelt got the job, said:
“Look, you don’t get to these jobs without being competitive... You want to win. You don’t want to win at [others’] expense, you just want to win.”

Evidence on Tournaments as Incentives

- Ehrenberg and Bognano – golf
- Knoeber – chickens
- Bull, Schotter, Weigelt – experiments
- Falk and Fehr – experiments
 - Find sabotage reduces effort
- Drago and Garvey – absenteeism

Bank evidence: Only Relative Performance Matters

Logit: Promotion

Performance score:	.03
	(.02)
Relative performance score:	.38
	(.02)

Log likelihood = -55629

N=142,038

Lessons from Tournament Theory

- To encourage incentives, need large after tax spread
 - Flatten tax structure
- Particularly true in risky industries
- Discourage nepotism

Human Resource Practices

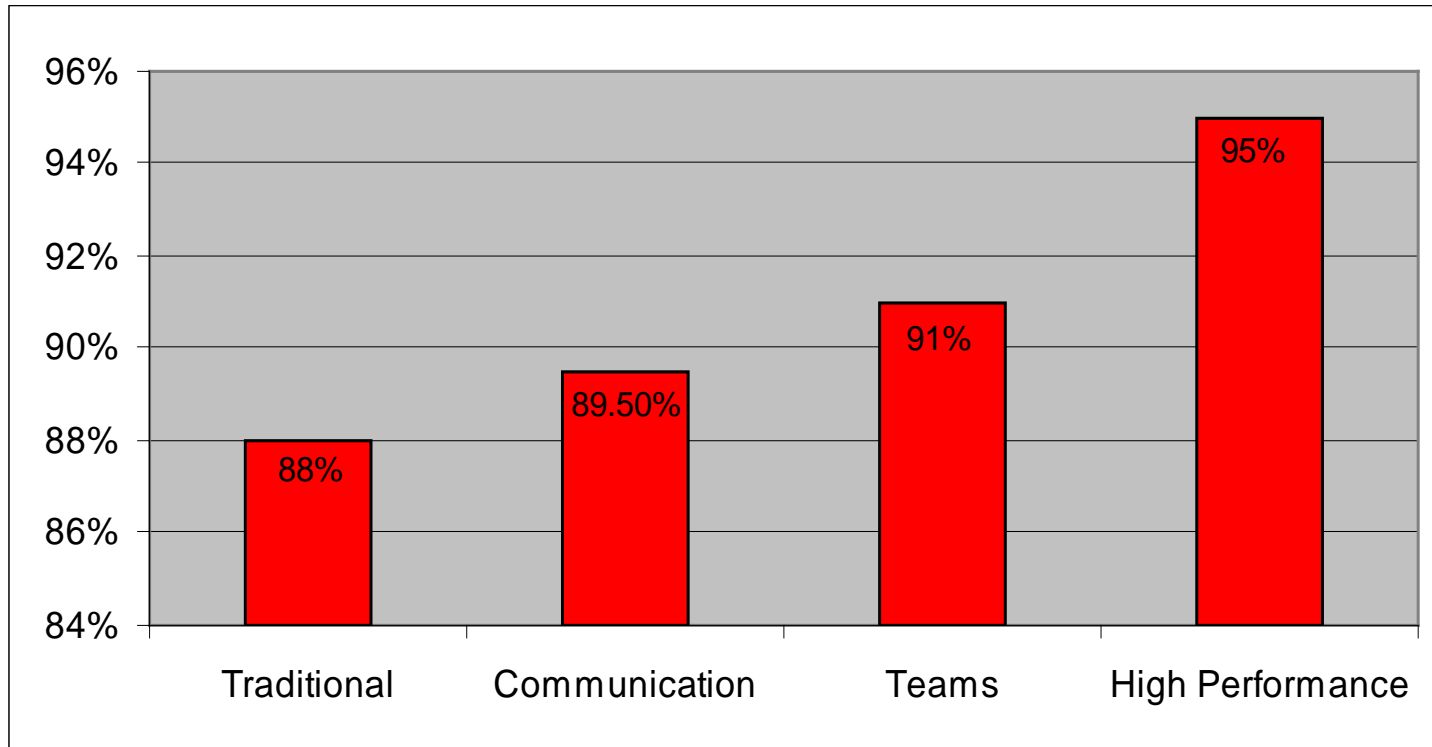
- Practices other than pay matter
- Evidence from steel mills

Four HRM Systems

	1 High Performance	2 Teams	3 Communication	4 Traditional
Incentive Pay	√	√	√	
Information Sharing	√	√	√	
Teams	√	√	some	
Training	√	√		
Employment Security	√	some		
Flexible job design	√	some		
Careful hiring	√			

Source: Ichniowski, Shaw and Prennushi (AER, 1997)

Predicted Uptime for HRM Systems in Steel Finishing Lines



➔ Mills with higher HRM have higher productivity.

Source: Ichniowski, Shaw, Prensushi (AER, 1997)

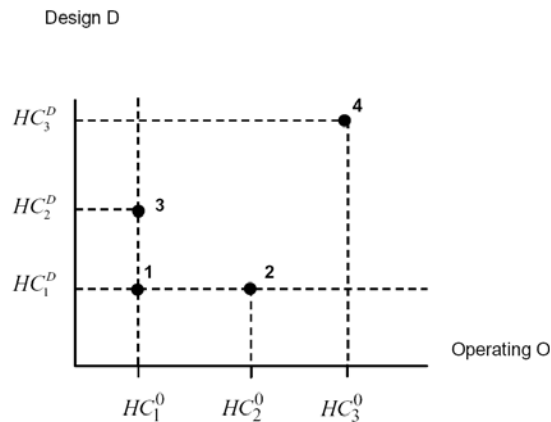
Pay in a Team context

- Need it for incentives in steel mills
- Free rider effect
- Team compensation ineffective for large groups
 - company based profit sharing
 - ESOP
- Team compensation destructive in non-team production environment
 - Levi Strauss

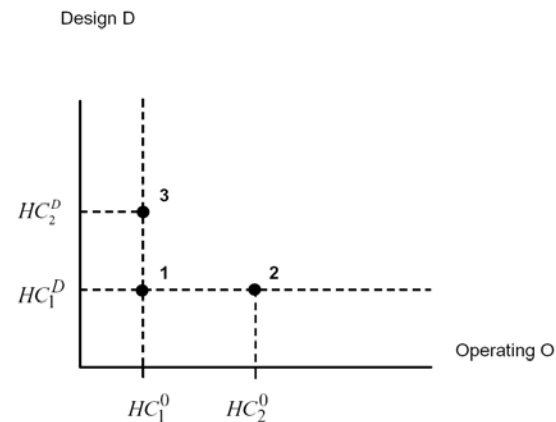
The Growth of Teams

- Teams have grown in importance as work has become more complex
- One person less likely to be dominant in all skills

Hierarchy



Team



- Hamilton, Nickerson, and Owan (2003) found more heterogeneous teams were more productive than homogeneous ones

Lessons from Team Studies

- Use teams when production is complementary
- Must couple with group incentive pay
- Teams more important in complex environments (biotech versus textiles)

Leadership

- Paramount for economic growth
- Leadership is central for new business and growing old business
- What is a leader?
 - Leaders choose correct direction
 - In doing so, they get correct answers more often and acquire followers

Implications

Leaders are Generalists

Know one area perfectly

$$\text{probability correct} = .5 (1) + .5 (0) = .5$$

Know both areas well

$$\text{probability of correct} = .5 (.8) + .5 (.8) = .8$$

Leaders are Generalists

- Test using CPS and Stanford data
- Distinguish between entrepreneurs and other leaders
- Entrepreneurs are a subset of leaders
 - Supported by CPS, Stanford and German data (Backes-Gellner and Moog)

Data

- Stanford MBAs
 - Job history
 - Courses and grades

Leadership and Roles

Table 2

Number of Prior Roles and Probability of Being a CLEVEL

NPRIOR	Probability of CLEVEL=1
One or two	.02
Five or more	.18

Panel Leadership Analysis:

Dependent Variable = CLEVEL

	1 Logit	2 Clustered Logit	3 Clustered Logit	4 Linear Probability Regression	5 Fixed Effect Linear Probability Regression	6 Fixed Effect Logit
NPRIOR	.064 (.008)	.064 (.011)	.143 (.035)	.002 (.002)	.017 (.004)	.168 (.024)
EXP	.054 (.004)	.054 (.004)	.069 (.027)	.011 (.001)	.011 (.001)	.043 (.008)
MBAYEAR	.016 (.003)	.016 (.003)	-.033 (.022)			
MALE	1.12 (0.13)	1.12 (0.15)	1.10 (0.26)			
SPECDIF			-.191 (.068)			
Constant	-5.54 (0.26)	-5.54 (0.32)	-1.07 (2.00)	.152 (.009)	.075 (.011)	
log likelihood	-5051	-5051	-956			-1678
ratio between-to- total variance					.22	
Observations	19120	19120	4887	5473	5473 (930 persons)	5371 (896 persons)

Courses of Study, Income and Leadership

	1 C-Level Clustered Logit	2 Log of Income Clustered Regres- sion	3 C-Level Clustered Logit	4 Log of Income Clustered Regres- sion
NPRIOR	.141 (.034)	-.025 (.012)	.137 (.034)	-.024 (.012)
EXP	.070 (.027)	-.068 (.009)	.072 (.027)	.068 (.009)
MBAYEAR	-.030 (.024)	.020 (.005)	-.030 (.024)	.020 (.005)
MALE	1.18 (0.21)	.261 (.031)	1.21 (.208)	.245 (.031)
SPECDIF	-.125 (.085)	.003 (.016)	-.112 (.084)	-.003 (.016)
ECONOMICS	.147 (.073)	-.005 (.016)	.156 (.073)	-.008 (.015)
FINANCE	-.103 (.058)	.097 (.011)	-.098 (.058)	.096 (.011)
GPA			-.300 (.141)	.141 (.035)
CONSTANT	-1.74 (2.34)	2.28 (0.48)	-.722 (2.387)	1.72 (0.50)
LOG LIKELIHOOD or R-square	-.951	.12	-.948	.13
OBSERVATIONS	4884	4241 (1738)	4884	4241 (1738)

Empirical Analysis on Stanford Data: Entrepreneurs

Variable	Column #		
	1	2	3
	Correlation Structure		
	Independent	AR-1	Unstructured
EXP	.0452 (.0036)	.0502 (.0039)	.0534 (.0038)
NPRIOR	.0851 (.0079)	.0769 (.0088)	.0706 (.0092)
MALE	.4757 (.0843)	.4562 (.0950)	.4565 (.0998)
MBAYear	-.0070 (.0074)	-.0044 (.0084)	.0054 (.0090)
AGE	-.0265 (.0078)	-.0250 (.0089)	-.0256 (.0095)
Wald chi sq.	842	706	786
Number of obs.	26819	26663	26819

Conclusions

- What can the government do?
- Macro
 - Already do most
 - Low taxes
 - Business friendly environment
 - Free trade
- Micro
 - Increased use of performance pay
 - Increased spreads (less wage compression)
 - Invest in human capital
 - Encourage teams
 - Provide general skills