Working conditions and garment factory performance: Findings from Cambodia

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WHY ARE HR PRACTICES DIFFERENT IN DEVELOPING COUNTRIES?

- HR practices define "sweatshop" conditions and include pay, environment, and training
- Market failures in supply chains exist (Harrison and Scorse 2010)
- Innovations in HR practices can improve firm performance (Ichniowski et al. 1997, Sheehan 2013)
- Inefficient practices may stem from lack of information (Bloom et al. 2013)
- HR experimentation is costly (Fung et al. 2001)
- Social norms may dominate laws (Acemoglu and Jackson 2014)

OUR CONTRIBUTION

- What do endogenous HR choices tell us about the relationship between working conditions and factory performance?
- Employ five different "natural experiments"
  - BFC
  - End of MFA
  - Public Disclosure
  - Financial Crisis
  - Falling Wages
- Use endogenous heterogeneous responses to common external shocks to infer the link between working conditions and factory performance

THE CAMBODIAN CASE

- The 1999 U.S.-Cambodia Bilateral Textile Trade Agreement formally linked market access to labor standards compliance.

- The International Labor Organization (ILO)'s Better Factories Cambodia (BFC) program monitors working conditions in Cambodian garment factories and assesses conditions relative to ILO Core Labor Standards and Cambodian labor law.

- Under the MultiFiber Arrangement (MFA), improved working conditions in the garment sector were required for increased quota access to the U.S. market (Polaski, 2009).

- The end of the MFA, however, removed the quota-access incentives and created an environment in which to evaluate the establishment performance effects of labor standards.

ANALYTICAL FRAMEWORK

- Acemoglu and Jackson (2014) model norm formation
- We follow their example with an overlapping-generations cooperation game with n firms
- Prominent agent: where firms information
  - Public reports (disclosure)
  - Personal contact
- Three firm types
  - πn always choose HIGH conditions (exogenous)
  - πn always choose LOW conditions (exogenous)
  - $(1-2\pi)n$ endogenous firms maximize objective function

$$P_{it} = (1-\lambda)\sum_{j=1}^{n} U(A_{it}, A_{j\,t-1}) + \lambda\sum_{j=1}^{n} U(A_{it}, A_{j\,t+1})$$

PAYOFF MATRIX

		A_j	
		H	L
A_i	H	β, β	$-\alpha, 0$
	L	$0, -\alpha$	$0, 0$

In the absence of BFC, firms believe that $\beta < 0$ and $\alpha > 0$. That is, there is no gain from coordination on high working conditions ($\beta < 0$) and the unilateral choice of high working conditions has a negative payoff ($\alpha > 0$).

FIRM HETEROGENEITY

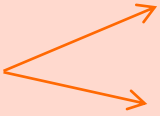| Factory Type	Compliant	Noncompliant
Exogenous High	Always	Never
Exogenous Low	Never	Always
Endogenous	$(1-\lambda)\Phi^t_{N\ t-1} + \lambda\Phi^t_{N\ t+1}$ $> \dfrac{\alpha}{\alpha+\beta}$ New Compliance	$(1-\lambda)\Phi^t_{N\ t-1} + \lambda\Phi^t_{N\ t+1}$ $< \dfrac{\alpha}{\alpha+\beta}$ Noncompliance, Retrogression

MODEL SOLUTION: THREE STEPS

- We begin by determining parameter values for which all endogenous firms choose H for all periods following a BFC report (High norm)

- We then find parameter values for which all endogenous firms choose L for all periods following a BFC report (Low norm)

- Within these two boundary cases, a path for A will evolve.

- We identify how A will respond to five different natural experiment-like events.

Figure 1: Identification with Five Natural Experiments

Pre-BFC	Compliance over time	End MFA ß=0 unless gains from national reputation	End Public Disclosure No prominent agent. Increasing s necessary to sustain H.	Financial Crisis	Global Wage Decline Rise in α
H-Type Exogenous **Or** $\gamma < \gamma_{HH}^{M}$ **High Norm**	→	→	→	→	→
Test and Interpretation of Results for the Endogenous Factories	High Public Report = High play by a Prominent Agent	National Reputation: ß>0 (or RS buyer), sustained compliance No Quota: ß=0 Retrogression	Learning size and sign of α (or RS buyer), sustained compliance Signal too low w/o prominent agent Retrogression	α<0 (or RS buyer, absent credit constraints) New compliance predicts survival α>0. New compliance predicts closure.	w^* down implies α down, Retrogression Survival
L-Type Exogenous **Or** $\gamma > \gamma_{LL}^{M}$ **Low Norm**	→	→	→	→	→

DATA

- The primary data are proprietary factory-level monitoring reports generated by the BFC Program.

- Our data include 446 individual factories with up to ten visits.

- Most factories (93.7 percent) are foreign-owned, with 45.3 percent originating in either China, Hong Kong SAR, Macau SAR, or Taiwan.

- While 446 factories enter the sample with a first visit, only 194 have survived to the sixth visit.

Monitoring Data

- 405 individual questions coded into binary variables.

- 62 have no variation and are dropped.

- The remaining questions are first aggregated heuristically to create 31 compliance categories.

- Factor analysis is then applied to the 31 compliance categories in an attempt to identify the underlying HR systems.

Factory Assessments by Year

VISIT	VISIT YEAR									
	2001	2002	2005	2006	2007	2008	2009	2010	2011	Total
1	85	34	7	188	30	37	27	20	18	446
2	0	0	18	122	136	34	28	16	6	360
3	0	0	0	48	186	33	24	27	5	323
4	0	0	0	0	80	152	27	20	11	290
5	0	0	0	0	11	112	82	24	12	241
6	0	0	0	0	0	38	102	42	12	194
7	0	0	0	0	0	0	52	75	20	147
8	0	0	0	0	0	0	11	43	28	82
9	0	0	0	0	0	0	0	13	12	25
10	0	0	0	0	0	0	0	3	2	5
Total	85	34	25	358	443	406	353	283	126	2,113

HR Systems from Factor Analysis

| Factor 1: Communication and Workplace Systems			Factor 4: Compensation	
6	Shop Stewards		10	Payment of Wages
7	Liaison Officer		11	Contracts/Hiring
23	Workplace Operations		16	Internal Regulations
			29	Accidents/Illnesses Com
Factor 2: Occupational Safety and Health			30	Holidays/Annual/Special
			31	Maternity Benefits
17	Health/First Aid			
18	Machine Safety		**Factor 5: Unions**	
19	Temperature/Ventilation			
20	Drinking Water		4	Collective Agreements
21	Sanitation		5	Strikes
22	Food		8	Unions
24	OSH Assessment/Recording		14	Sexual Harassment
25	Chemicals		15	Disputes
26	Emergency Preparedness			
Factor 3: Modern HR Practices			**Factor 6: Core Labour Standards**	
9	Information About Wages		1	Child Labour
12	Termination		2	Discrimination
13	Discipline		3	Forced Labour
27	Overtime			
28	Regular Hours/Weekly Rest			

TEST 1: COMPLIANCE RATES OVER TIME

- Constant Compliance indicates an established (unchanging) social norm.
- Changing compliance indicates endogenous responses to outside stimuli (e.g. BFC).
- We formally evaluate changes in average compliance over time.

AVERAGE COMPLIANCE RATES BY BUYER TYPE

Mean External Compliance
Better Factories Cambodia
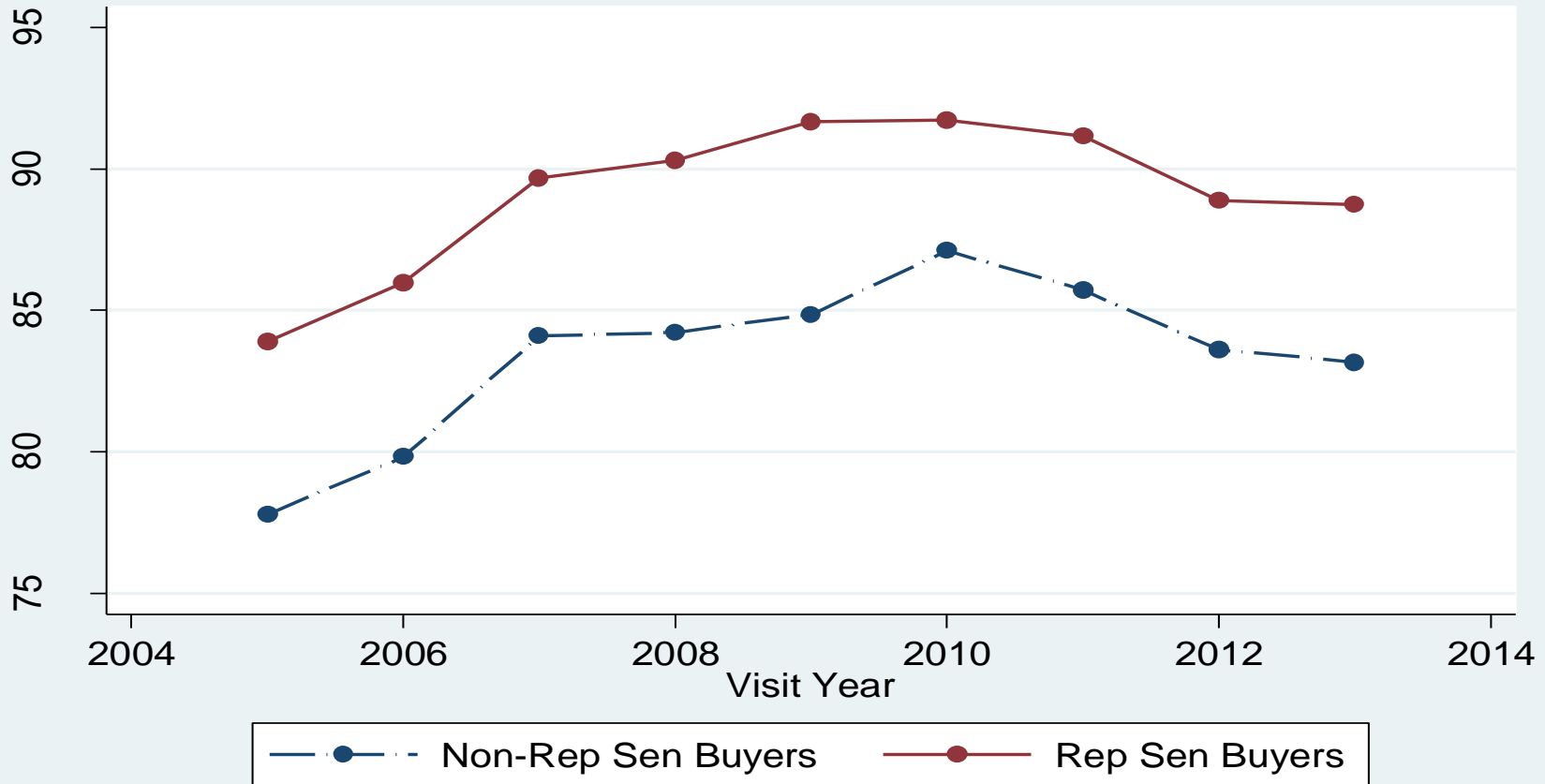
TIME REGRESSION RESULTS

- Time and time squared both significant
- Including controls for price index (and alternative price index), Crisis, Recovery, and Wages
- Results for different Factor Groups consistent across specifications
- Implication: Social norms are changing and endogenous firms are responding to external stimuli
  - Firms perception of alpha are changing
 - Norms will follow change in perceptions

TEST 2: END OF THE MFA

- Prior beliefs suggested that the quota system was giving an incentive to improve working conditions.

- Removal of the quota would then eliminate the incentive to improve working conditions. (Everyone thought that beta would go to zero)

- Prior beliefs also suggested that the exports from Cambodia would fall after the end of the MFA.

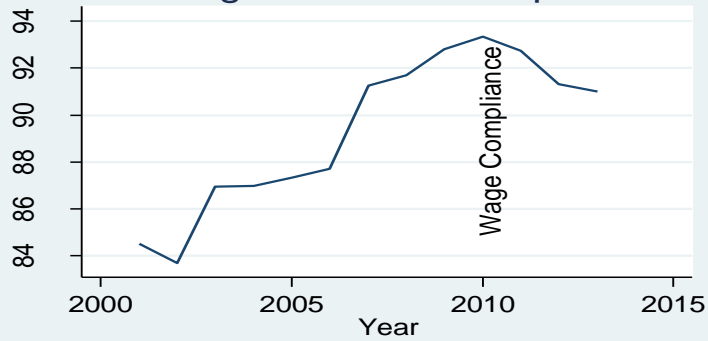- Implication: Rise of national reputation that matters beyond quota

U.S. Apparel Imports from Cambodia
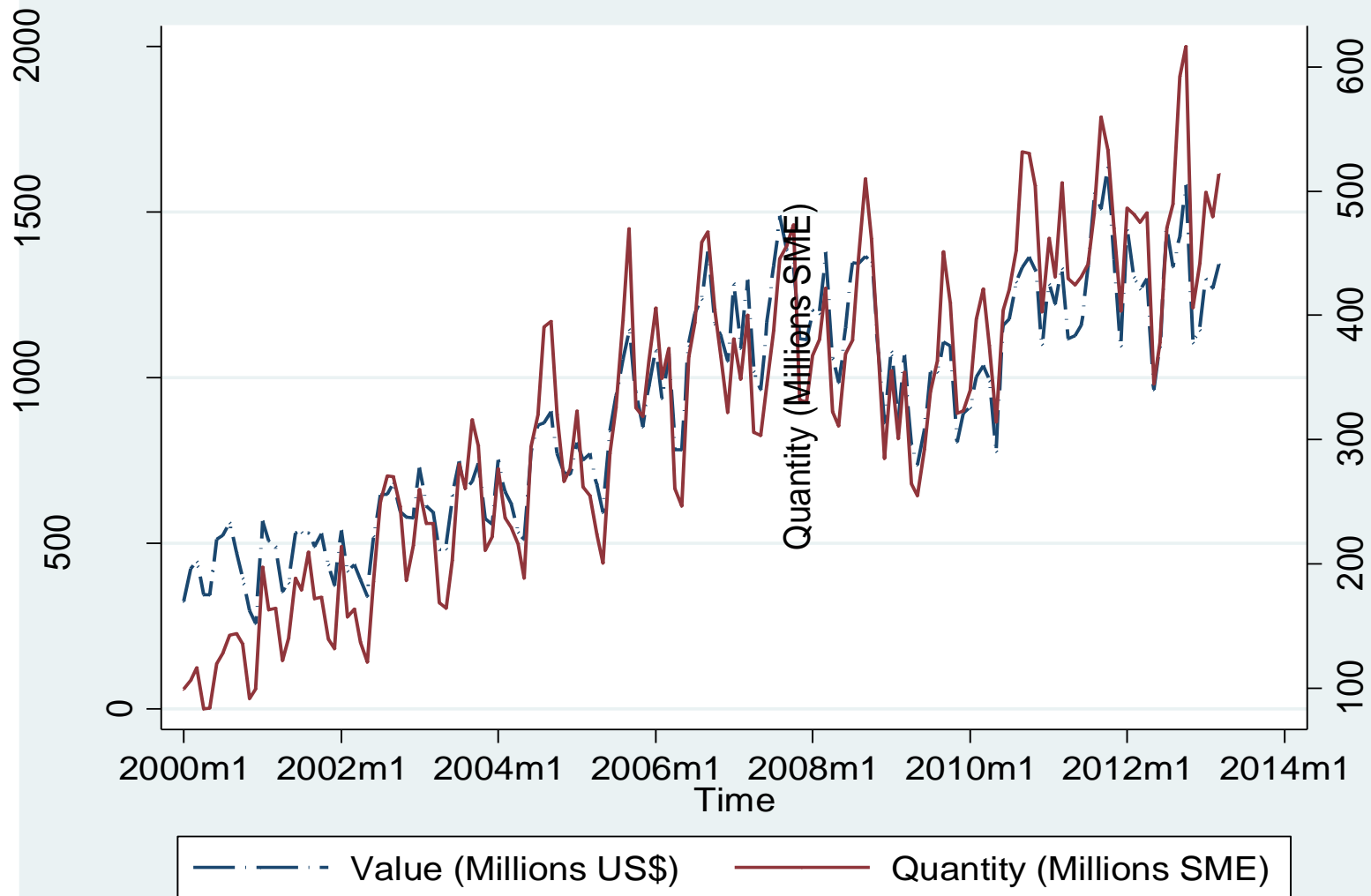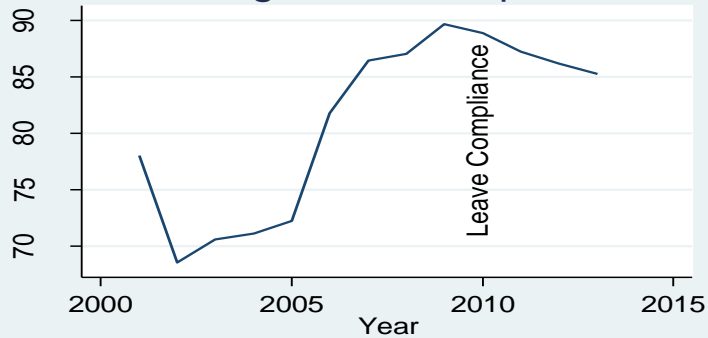
COMPLIANCE BY YEAR

TEST 3: END OF PUBLIC DISCLOSURE

- Prior to November 2006, BFC publically disclosed factories and their individual points of non-compliance.
- Using compliance data from Better Factories Cambodia through 2008, Ang et al. (2012) find that public disclosure had significant effects on factory compliance.
- The end of public disclosure disrupted the mechanism by which Cambodian firms were controlling free riding of low compliance firms on the reputation created by high compliance firms, providing an opportunity to test whether the norm constraint was binding on firm behavior.
- Formal empirical approach: retrogression.
- $z_t^* - z_{t-1}^* = g(C, D, RS, p, w; I_t, I_s)$ where $z_t^* = 1$, $z_{t-1}^* = 0$, and $z_s^* = 0$ for $t-1 > t > s$.
- If the norm constraint was binding during the public disclosure period but relaxed when the public disclosure was terminated, there should be a structural break in retrogression in November 2006, which can be detected by a Chow test.

CHOW AND THE ANDREWS-PLOBERGER EXP-LM BREAK TEST FOR RETROGRESSION
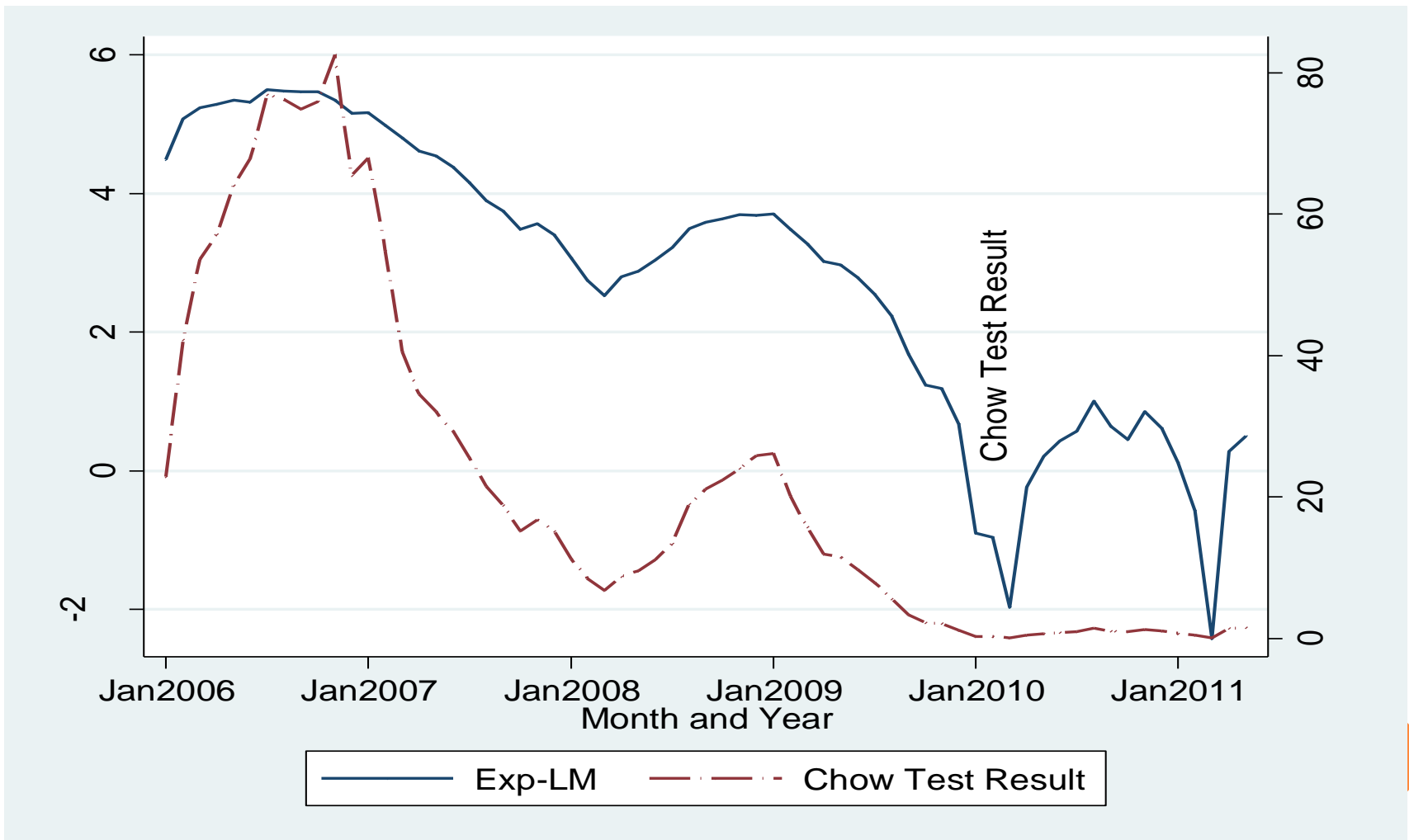
RETROGRESSION HAZARD ESTIMATION

- A production efficiency effect can be detected if firms lacking a reputation sensitive buyer remain in compliance after the end of the public disclosure period.

- In the post-public disclosure period, there is no prominent agent and the credit constraint is not binding.

- If we assume that the impact of information is nonnegative, then it follows from profit maximization that if $\frac{dz_i^*}{dI} > 0$ then $f_i > 0$, *ceteris paribus*. That is, if available information increases the level of compliance in the absence of a norm or credit constraints, then the marginal product of compliance must be positive.

- Our final test, then, is to look for evidence that $\frac{dz_i^*}{dI} > 0$ for firms lacking a reputation sensitive buyer after the public disclosure period.

Retrogression Hazard Estimation				
Communication	1.103***		RS Buyer	0.060
	(0.072)			(0.043)
OSH	0.767***		Log Employment	-0.042
	(0.053)			(0.026)
HR Innovation	0.752***		Apparel Price Index	-0.239
	(0.061)			(0.325)
Compensation	0.103		Wages	0.796***
	(0.066)			(0.239)
Unions	-2.118***		Crisis	0.079
	(0.270)			(0.053)
Constant	-15.461***		Recovery	0.066
	(2.984)			(0.076)
			Public Disclosure	-2.286***
Observations	689,080			(0.132)

SURVIVAL

- The probability of survival is taken to depend on current period profits, a credit constraint applying to operations ($\tilde{C}$) and buyer type, as $\Pr(S) = s(\pi^*, \tilde{C}, RS)$

- We do not observe profits π. But we do observe working conditions Z. By Hotelling's lemma, all economically relevant information in π^* is also implicit in Z^*. Thus, the survival function can be re-specified as $\Pr(S) = \tilde{s}(Z^*, \tilde{C}, RS)$

- Key to identification: focus on NEW compliance. Original compliance is determined by factory-specific quality. New compliance is a response to outside stimuli.

Endogenous Factory Effects I: Good Factories make Good Decisions

| Managerial Quality	α>0: Compliance Bad for Survival	α<0: Compliance Good for Survival
High Quality Manager	Low Compliance, Survive	Compliance, Survive
Low Quality Manager	High Compliance, Close	Low Compliance, Close

Test: A positive correlation between compliance and survival jointly identifies α<0 with high quality mangers choosing compliance and low quality managers choosing noncompliance. A negative correlation between compliance and survival jointly identifies α>0 with high quality managers choosing noncompliance (and surviving) and low quality managers choosing compliance (and closing).

ESTIMATING SURVIVAL

- Follow a large literature estimating factory survival in developing countries

- Kaplan-Meier survival function

- Estimate Cox (David R. Cox 1972) proportional hazards model

KAPLAN-MEIER SURVIVAL ESTIMATES
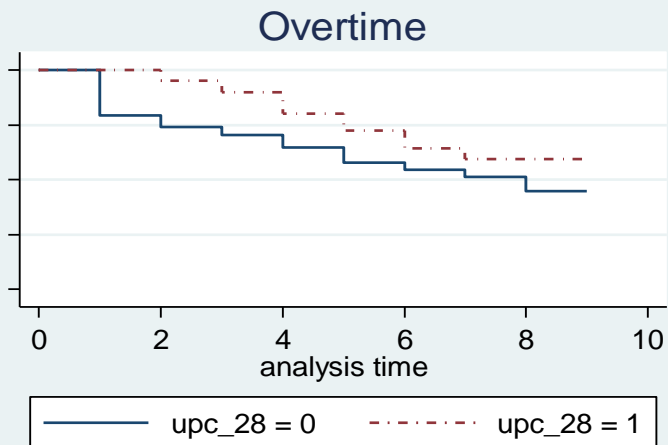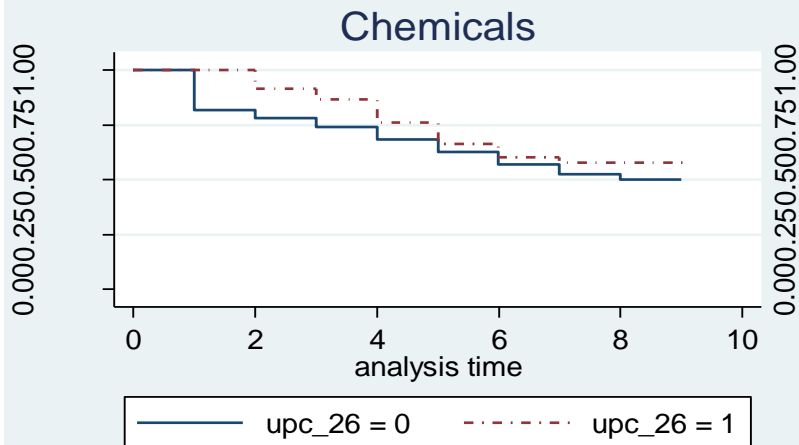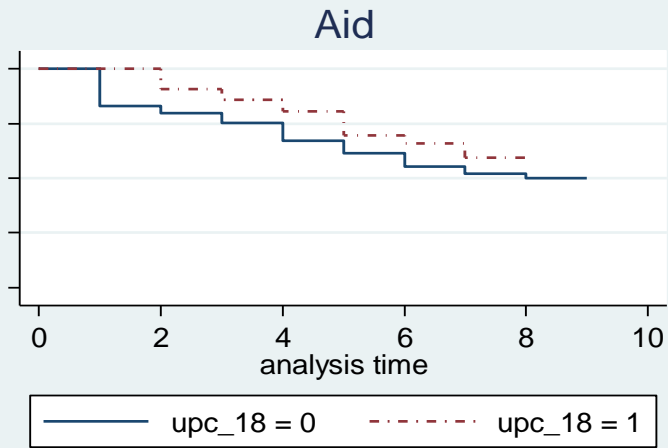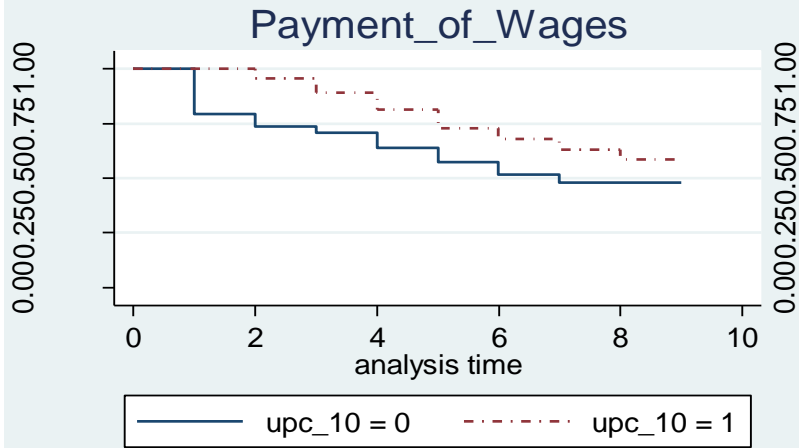
Cox Proportional Hazards Model
(Second Visit Improvement Indicator)

Communication	-0.507***	Owned: Anglo	-0.194	RS Buyer	-1.006***
	(0.185)		(0.314)		(0.212)
OSH	-0.229	Owned: Korea	-0.396	Log Emp	-0.267**
	(0.195)		(0.406)		(0.112)
HR Innovation	-0.459**	Owned: China	-0.283	Crisis=1	1.923***
	(0.191)		(0.307)		(0.189)
Compensation	-0.541***	Owned: Other Asia	-0.1	Recovery=1	1.767***
	(0.192)		(0.385)		(0.246)
Unions	-0.085	Owned: Other	0.890*	Constant	0.096
	(0.196)		(0.461)		(0.743)
Observations	1,822				

Notes: Coefficients (not hazard ratios) are reported. Compliance categories in column are represented by a dummy variable equal to 1 if compliance in that area increased between the first and second visit, and 0 otherwise.

ENDOGENOUS FACTORY EFFECTS II: BUYER TYPE

- Co-determination of survival and BFC-human resource management innovations by buyer type can be rejected if buyer type is not a significant variable in a firm's decision to retrogress.

- Does buyer type deter retrogression even if $\alpha > 0$? If firms lacking an RS buyers are no more likely to retrogress than firms with an RS buyer, then buyer type is not deterring retrogression.

	Retrogression Hazard Estimation				
Communication	1.103***		RS Buyer	0.060
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OSH	0.767***		Log Employment	-0.042
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Unions	-2.118***		Crisis	0.079
	(0.270)			(0.053)
Constant	-15.461***		Recovery	0.066
	(2.984)			(0.076)
			Public Disclosure	-2.286***
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TEST 4: FINANCIAL CRISIS

- Credit constraints for exporters significantly tightened during the financial crisis of 2008-2009.

- If the credit constraint is binding on compliance choices, retrogression should exhibit a structural break during the crisis period.

- A Chow test and the more sensitive Andrews-Ploberger test are employed to identify a structural break in retrogression during the crisis period.

CHOW AND THE ANDREWS-PLOBERGER EXP-LM BREAK TEST FOR RETROGRESSION
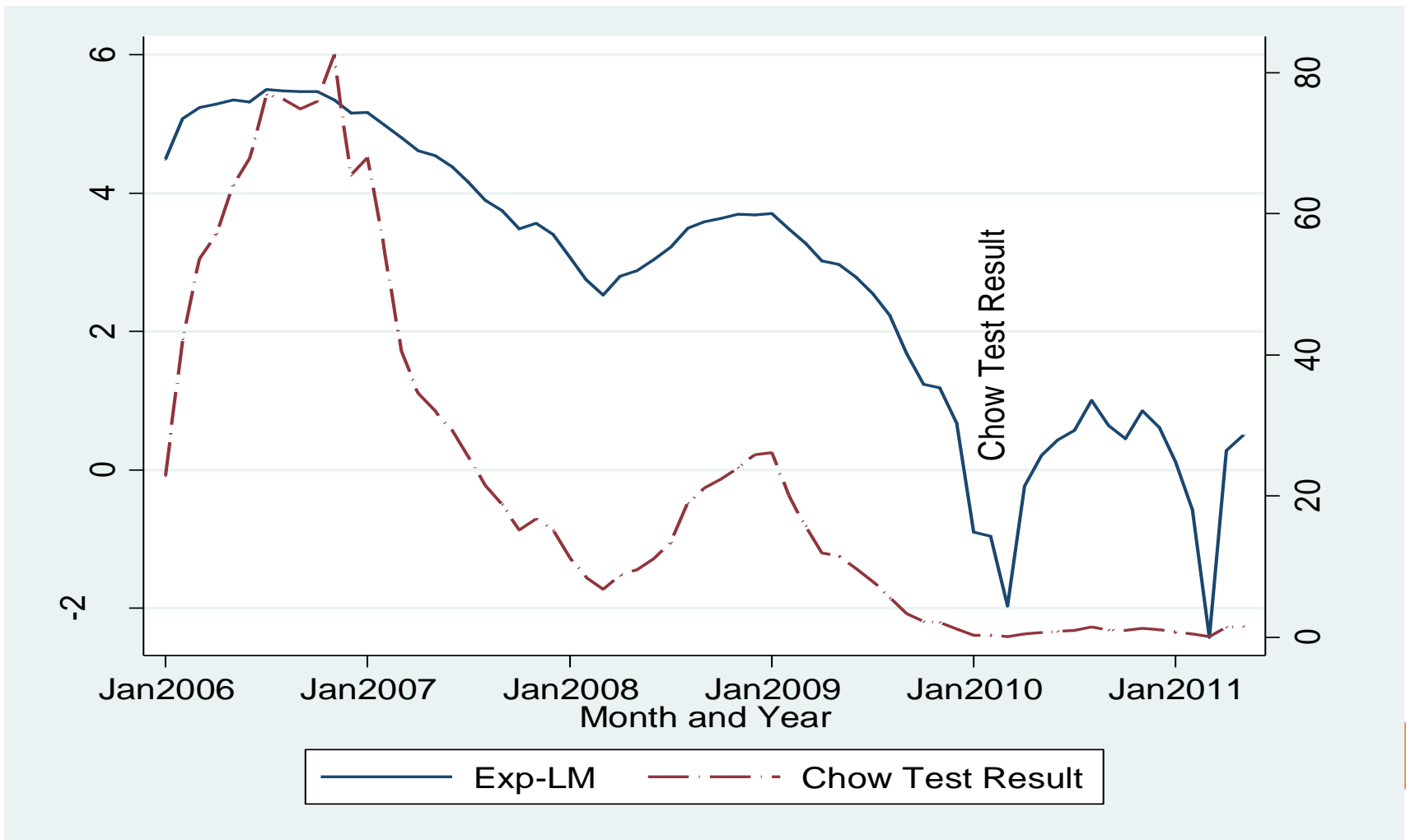
THE CRISIS AND RETROGRESSION

Credit Constrained	Credit Constrained	Not Credit Constrained
Financial Crisis	Noncompliant	Compliant if α<0
Test 5: Does tightening of the credit constraint during the financial crisis increase retrogression?		

Retrogression Hazard Estimation

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TEST 5: FALLING APPAREL WAGES

- Global drop in apparel wages that followed drop in apparel prices

- Falling wages implies that the benefit to the firm from improving working conditions unilaterally (the alpha parameter) falls

- Implication: falling wages should reduce compliance (increase retrogression) as firms spread drop in labor demand through compensation package (HR practices)

Retrogression Hazard Estimation

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Summary of Results

Test	Results
Compliance Time Trend	Overall Positive, falling after crisis
End of MFA	Exports rise, Compliance rises
End of Public Disclosure	Retrogression is lower
Financial Crisis	Does not affect retrogression
Falling Wages	Lowers compliance/increases retrogression

CONCLUSIONS

- International labor standards and improved working conditions are commonly resisted as anti-competitive, forcing firms and workers to deviate from market-determined wages and working conditions.

- The challenge to firms, however, is that acquiring the managerial knowledge necessary to optimally manage human capital can be as challenging as for physical capital, yet firms may be comparatively resistant to investing in human resource systems.

- Compliance is positively related to survival. We rule out four alternative explanations for the results.

U.S. FTAs with Labor Provisions
(Date agreement became effective in parentheses)

- **North American Agreement on Labor Cooperation (1993)**
- **U.S. — Jordan Free Trade Agreement (Jan 1 2010)**
- **U.S. — Chile Free Trade Agreement (Jan 1 2004)**
- **U.S. — Singapore Free Trade Agreement (Jan 1 2004)**
- **U.S. — Morocco Free Trade Agreement (Jan 1 2006)**
- **U.S. — Australia Free Trade Agreement (Jan 1 2005)**
- **U.S. — Bahrain Free Trade Agreement (Jan 11 2006)**
- **U.S. — Central America-Dominican Republic Free Trade Agreement (last, CR, Jan 1 2009)**
- **U.S. — Oman Free Trade Agreement (Jan 1 2009)**
- **U.S. — Peru Trade Promotion Agreement (Feb 1 2009)**
- **U.S. — Colombia Free Trade Agreement (May 15 2012)**
- **U.S. — Panama Trade Promotion Agreement (U.S. signed into law Oct 21 2011)**
- **U.S. — Republic of Korea Free Trade Agreement (March 15 2012)**