

Registration-Based IPO Reform and the Validity of Multifactor Models: An Empirical Test Based on Chinese A-Shares

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Abstract:

The registration-based IPO reform signifies a substantial institutional transformation within China's capital market. This study utilizes a dataset comprising 389,140 observations from Chinese A-share listed companies between 2016 and 2024, employing the launch of the STAR Market in 2019 as a quasi-natural experiment. This study employs a multifaceted methodological approach, encompassing the difference-in-differences (DiD) method, mediation model, and panel error correction model (ECM), to examine the impact of this reform on the validity of the Fama-French five-factor model (FF5). The findings of the study indicate that following the implementation of the reform, there was a substantial increase in the model's R^2 by 2.1%, as well as a significant rise in the model's $|\alpha|$ (where $|\alpha|$ denotes the absolute value of the intercept) by 5.97%. The analysis indicates that the mediating effect of disclosure quality accounts for 89.30% of the total effect, while the half-life experienced an extension from 2.42 months to 3.51 months, marking a 45% increase. This study makes a significant contribution to the asset pricing research field by expanding its scope to include institutional dependence. By examining this phenomenon, it becomes possible to understand the trade-off between disclosure quality and pricing efficiency resulting from the reform.

Keywords: Registration-based reform; Institutional dependence; Multifactor models; Asset pricing; Market efficiency

1. Introduction

The initial proposal of registration-based reform at the Third Plenary Session of the 18th Central

Committee in 2013 signaled a fundamental shift in China's capital market. The transition from an approval-based IPO reform to a registration-based reform has had a considerable impact on the dynamics

of stock issuance. This transformation has significantly affected on market pricing efficiency and has become a focal point of attention for both academia and the industry. Multifactor models are widely utilized benchmark tools for asset pricing, serving three primary functions: risk assessment, testing of market efficiency, and evaluation of investment performance. However, conventional research implicitly assumes a static and homogeneous market environment, overlooking the profound influence of institutional environment. The adaptive market hypothesis posits that market efficiency is subject to dynamic evolution in response to shifts in the institutional environment (Lo, 2004). Reforms offer a unique quasi-natural experiment for investigating the interplay between institutional environment and asset pricing. However, the mechanisms of transmission, the mediating effects, and the pricing efficiency remain to be thoroughly examined (Huang Jun et al., 2022).

This study posits three fundamental research inquiries. This study seeks to examine the hypothesis that the validity of multifactor model is contingent upon the market institutional environment. It is imperative to ascertain the impact of the registration-based reform on the R^2 and α of the FF5 model. It is imperative to elucidate the underlying mechanisms that govern this phenomenon. To address these inquiries, this study employs a comparative analysis of model performance prior to and following the implementation of the reform. The model utilizes a DiD design to ascertain causal effects, constructs a mediation model to assess the transmission role of disclosure quality, and utilizes an ECM to examine the dynamic fluctuations in the rate of pricing error correction.

The primary conclusions of this study are as follows: following the reform, R^2 increased by 2.1%, and $|\alpha|$ rose by 5.97%; enhanced disclosure quality accounted for 89.30% of the mediating effect; and the half-life of mispricing increased from 2.42 months to 3.51 months, representing a 45% rise. This study is pioneering in its examination of the reform's impact on the validity of the multifactor model from the perspective of institutional dependence. It reveals the mediating role of disclosure quality and investigates the heterogeneous effects of pricing error levels and correction speeds.

2. Literature Review and Theoretical Framework

2.1 Registration-Based Reform and the Measurement of Multifactor Model Validity

A comprehensive review of the extant literature reveals that the impact of reforms on capital markets is primarily reflected in three dimensions: pricing efficiency, informa-

tion disclosure, and market trading characteristics. This finding is supported by research from both domestic and international sources. Information disclosure and investor protection systems have been identified as pivotal to pricing efficiency (Ritter, 1991; Shleifer and Vishny, 1997). The efficacy of reforms in enhancing secondary market pricing efficiency has been demonstrated by studies that have examined the impact of investor structure and information environment optimization (Chen J et al., 2020; Huang J. et al., 2022). As demonstrated in the extant literature, the quality of financial disclosure exerts a substantial influence on the cost of capital, market liquidity, and the efficiency of resource allocation (Healy and Palepu, 2001; Leuz C. and Wysocki P. D., 2016)"issue": "2-3", "journalAbbreviation": "Journal of Accounting and Economics", "language": "en-US", "page": "525-548", "title": "Economic consequences of financial reporting and disclosure regulation: A review and suggestions for future research", "volume": "61", "author": [{"literal": "Leuz C"}, {"literal": "Wysocki P D"}], "issued": {"date-parts": [{"2016"}]}}, "schema": "https://github.com/citation-style-language/schema/raw/master/csl-citation.json" .

The empirical validity of multifactor models is primarily assessed using R^2 and the intercept term α . Specifically, R^2 is a measure of the extent to which multifactor models explain fluctuations in asset returns (Fama and French, 2015). By contrast, α is a measure of the excess return in asset returns that cannot be explained by systematic risk factors (Jensen, 1968). Consequently, GRS tests, R^2 comparisons, and α analysis have emerged as the prevailing metrics for assessing model validity.

2.2 Research Gaps

A review of extant research in this area reveals three notable shortcomings. First, there remains a significant dearth of cross-sectional studies on asset pricing and the institutional environment. Secondly, the intrinsic transmission mechanisms through which reforms affect market pricing efficiency have yet to be elucidated. Thirdly, the multidimensional measurement of pricing efficiency necessitates further exploration.

3. Theoretical Analysis and Research Hypotheses

3.1 Theoretical Analysis

The Efficient Market Hypothesis (Malkiel and Fama, 1970) posits that market efficiency depends on the speed at which information is incorporated into prices. The Adaptive Market Hypothesis, as proposed by (Lo, 2004), asserts that market efficiency is subject to a dynamic evo-

lution in response to prevailing market conditions. In the nascent stages of reform, market participants are obligated to allocate resources for the purpose of learning and adaptation. Furthermore, the enhancement of information disclosure quality has been demonstrated to reduce information asymmetry, thereby promoting enhanced market pricing efficiency and resource allocation efficiency (Jensen and Meckling, 1976). In accordance with the tenets of institutional economics, the actions of economic agents are constrained and incentivized by the prevailing institutional environment (Douglass C. North, 1990).

3.2 Research Hypotheses

H1: Subsequent to the registration-based reform, the R^2 of the FF5 model will undergo a substantial increase; however, the direction of change in α remains indeterminate.

H2a: The implementation of the registration-based reform leads to a substantial enhancement in disclosure quality.

H2b: The relationship between the registration-based reform and the enhanced validity of the multifactor model is mediated by improvements in the quality of information disclosure.

H3: Subsequent to the implementation of the registration-based reform, a marked increase in the rate of correction for pricing errors was observed, and a significant reduction in the error half-life was experienced.

4. Research Design

4.1 Sample Selection and Data Sources

This study uses a sample of Chinese A-share listed companies from January 2016 to December 2024, encompassing a total of 108 months. The launch of the STAR Market in July 2019 has been designated as the policy implementation date for the reform.

The sample screening criteria include the exclusion of companies in the financial sector; companies classified as ST and PT; companies that have been listed for less than six months; samples with missing values for key variables; and winsorizing continuous variables at the 1st and 99th percentiles. The final sample comprised 389,140 firm-month observations from 5,151 companies. The primary data set for this study was obtained from the CSMAR database.

4.2 Variable Definitions

4.2.1 Policy variables

The policy dummy variable *Post* is set to 1 for July 2019 and later; the treatment group dummy variable *Treated* is set to 1 for ChiNext companies; and the interaction term *Post*×*Treated* is utilized.

4.2.2 Dependent variables

Pricing errors ($|\alpha|$) and the average explanatory power (R^2) are estimated using rolling regression based on the FF5 model (12-month window, at least 9 valid observations).

4.2.3 Mechanism variable

The quality of information disclosure (KV index) is constructed using firm-level daily data; a lower value indicates higher information disclosure quality.

4.2.4 Control variables

The following variables were considered in the study: firm size (*Size*); book-to-market ratio (*BM*); share turnover (*Turnover*); institutional ownership (*InstOwn*); and excess return (*ExRet*). All continuous variables are winsorized at the 1st and 99th percentiles.

4.3 Empirical Models

Model 1: DiD:

$$|\alpha_{it}| = \beta_0 + \beta_1 (\text{Treat}_i \times \text{Post}_t) + \gamma X_{it} + \mu_i + \lambda_t + \epsilon_{it}$$

Model 2: Mediation Model:

$$KV_{it} = \alpha_0 + \alpha_1 (\text{Treat}_i \times \text{Post}_t) + \gamma X_{it} + \mu_i + \lambda_t + \epsilon_{it}$$

$$|\alpha_{it}| = \beta_0 + \beta_1 (\text{Treat}_i \times \text{Post}_t) + \beta_2 KV_{it} + \gamma X_{it} + \mu_i + \lambda_t + \epsilon_{it}$$

Model 3: ECM:

$$\Delta |\alpha_{it}| = \theta_0 + \theta_1 |\alpha_{i,t-1}| + \theta_2 (\text{Post}_t \times |\alpha_{i,t-1}|) + \gamma \Delta X_{it} + \mu_i + \lambda_t + \epsilon_{it}$$

The error correction rate is measured by the half-life:

$$\text{Half-life} = \frac{\ln f_0(0.5)}{\ln f_0(1 + \theta_1 + \theta_2 \text{Post}_t)}$$

5. Empirical Results

5.1 Descriptive Statistics

Table 1 presents the descriptive statistics for the primary variables. As illustrated in Table 2, the implementation of the reform led to a substantial increase in R^2 , with a percentage change of 2.1%, and a notable rise in $|\alpha|$, amounting to 1.4%. The statistical analysis depicted in Table 3 establishes a robust negative correlation between R^2 and $|\alpha|$ (-0.1102). This outcome aligns with the anticipated relationship, suggesting that as $|\alpha|$ diminishes, R^2 exhibits a corresponding increase. Moreover, $|\alpha|$ exhibits a substantial negative correlation with *Size*, *Turnover*, and *InstOwn*, while concurrently demonstrating a considerable positive correlation with *BM*. A comprehensive evaluation of the control variables discloses the absence of any significant multicollinearity concerns.

Table 1.Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Median	Maximum
R^2	332,975	0.6645	0.1895	0.0061	0.6942	0.9981
$ \alpha $	332,975	0.1260	0.0337	0.0000	0.1280	0.4350
α	332,975	-0.1258	0.0343	-0.4350	-0.1280	0.2535
Size	389,140	15.2375	0.9930	9.9394	15.2184	16.7567
BM	389,140	4.5414	1.0522	0.0222	5.0000	5.0000
Turnover	389,140	0.4944	0.4263	0.0000	0.3339	1.4484
InstOwn	389,140	0.4077	0.2531	0.0000	0.4175	1.0000
ExRet	389,140	-0.1247	0.1141	-0.3981	-0.1325	0.1398

Table 2.Test for Differences in Group Means

Variable	Before Reform	After Reform	Difference	t-value
R^2	0.6533	0.6669	0.0136***	15.54
$ \alpha $	0.1246	0.1264	-0.0018***	11.87
Size	15.3584	15.2622	-0.0962***	-29.93
BM	4.5212	4.5288	0.0076***	2.07
Turnover	0.4260	0.4853	0.0593***	43.12
InstOwn	0.4052	0.4093	-0.0013	-1.56
ExRet	-0.1327	-0.1207	0.0120***	30.62
Observations	115,589	273,551	-	-

Table 3.Correlation Matrix

Variable	R^2	$ \alpha $	Size	BM	Turnover	InstOwn	ExRet
R^2	1.0000						
$ \alpha $	-0.1102***	1.0000					
Size	-0.0584***	-0.1416***	1.0000				
BM	0.0927***	0.1557***	-0.5345***	1.0000			
Turnover	-0.0638***	-0.1326***	-0.3058***	0.0985***	1.0000		
InstOwn	0.0234***	-0.0456***	0.4523***	-0.0891***	-0.2345***	1.0000	
ExRet	0.0138***	-0.1645***	0.0774**	-0.0240***	-0.0240***	0.1575***	1.0000

5.2 Causal effect of the registration-based reform on $|\alpha|$

As demonstrated in Table 4, Column (4) (the strictest specification), the Post×Treated coefficient is 0.0075 ($p < 0.01$). This finding indicates that the reform caused a

significant increase of 0.0075 in the $|\alpha|$ of ChiNext companies, equivalent to 5.97% of the sample mean. As demonstrated in Figure 1, the trends exhibited by the treatment and control groups were parallel prior to the implementation of the reform, thereby satisfying the DiD identification assumption.

Table 4. Difference-in-Differences Estimation Results

Variables	(1)	(2)	(3)	(4)
Post×Treated	0.0033***	0.0058***	0.0070***	0.0075***
	(0.0010)	(0.0010)	(0.0011)	(0.0011)

Size		Control	Control	Control
BM		Control	Control	Control
Turnover		Control	Control	Control
InstOwn		Control	Control	Control
Firm fixed effects	No	No	Yes	Yes
Time fixed effects	No	No	No	Yes
Observations	332,975	332,975	332,975	332,975
R ²	0.0010	0.0618	0.0764	0.0841

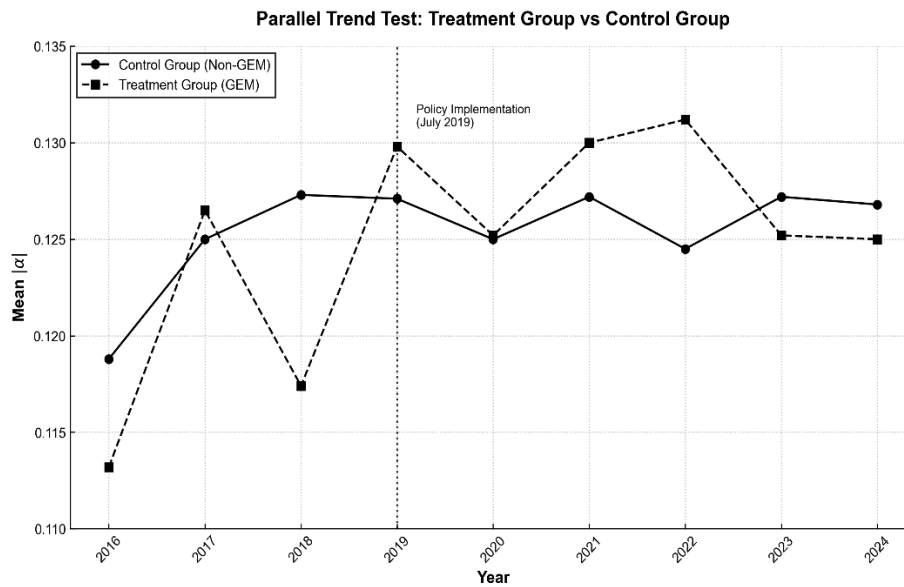


Figure 1. Parallel Trend Test

5.3 Test of the mediating effect of disclosure quality

Table 5: The results indicate that the reform led to a substantial enhancement in disclosure quality. This assertion is further substantiated by the hypothesis that a decrease in the KV index is concomitant with an enhancement in quality. The enhancement in the quality of information disclosure led to a substantial reduction in α , thereby validating hypothesis 2b. The mediating effect accounts for 89.30% of the total effect.

Table 5. Test of the mediating effect of disclosure quality

Variables	(1) KV	(2) $ \alpha $
Post×Treated	-0.0033*** (0.0002)	-0.0039*** (0.0008)
KV		-0.5941*** (0.0465)
Size	Control	Control
BM	Control	Control
Turnover	Control	Control
InstOwn	Control	Control
ExRet	Control	Control

Firm fixed effects	Yes	Yes
Time fixed effects	Yes	Yes
Observations	316,159	316,159
R ²	0.0440	0.0363
Mediating effect		0.00198
Bootstrap 95% CI		[0.00186, 0.00215]
Sobel Z-value		10.61***
Mediation proportion		89.30%

5.4 Dynamic Effects Test: Changes in the Speed of Price Error Correction

As demonstrated in Table 6, the market appears to possess a substantial error correction mechanism, as evidenced by

the absolute value of the error correction speed, which underwent a 28.0% reduction following the reform. Pursuant to half-life analysis, it was determined that the half-life following the reform reached 45.0%, thereby invalidating H3.

Table 6. Estimation Results of the Error Correction Model

Variables	(1)	(2)	(3)
$ \alpha_{i,t-1} $	-0.2079***	-0.2080***	-0.2488***
	(0.0081)	(0.0081)	(0.0092)
Post $\times \alpha_{i,t-1} $	0.0685***	0.0684***	0.0697***
	(0.0064)	(0.0064)	(0.0068)
Δ Size		-0.0012	-0.0012
		(0.0015)	(0.0015)
Δ BM		0.0034	0.0034
		(0.0042)	(0.0042)
Δ Turnover		-0.0001***	-0.0001***
		(0.0000)	(0.0000)
Δ InstOwn		-0.0025	-0.0025
		(0.0031)	(0.0031)
Firm fixed effects	Yes	Yes	Yes
Time fixed effects	No	No	Yes
Observations	327,977	327,977	327,977
Firms	4,961	4,961	4,961
R ²	0.128	0.132	0.142
Half-life (pre-reform)			2.42 months
Half-life (post-reform)			3.51 months
Percentage Change			+45.0%

5.5 Robustness Tests

In order to ensure the reliability of the core findings, this study examines robustness from various perspectives, including sample period selection, factor model speci-

cation, counterfactual tests, sample selection bias, core variable substitution, standard error adjustments, and outlier handling. Table 7 offers a synopsis of the outcomes of these evaluations, with all evaluations corroborating the robustness of the fundamental conclusions.

Table 7. Robustness Test Results

Test	Post×Treated	Standard Error	Observations	R ²	Notes
Excluding 2019 samples	0.0105*	(0.0013)	295,508	0.0852	Excluding the impact of the policy transition period
the Fama-French three-factor model	-0.0027*	(0.0006)	269,783	0.0743	Ensuring that conclusions are not dependent on specific factor settings
Placebo test	0.0028	(0.0021)	166,842	0.0681	Assuming the reform was moved up by two years to July 2017
Propensity score matching	0.0073*	(0.0012)	326,166	0.0836	Nearest Neighbor Matching k=1
Binary clustering	0.0075*	(0.0023)	332,975	0.0841	Two-way clustering by firm and time.
Replace KV Index	0.0074*	(0.0011)	326,166	0.0843	Replace KV Index with Shenzhen Stock Exchange evaluation results
0.5% winsorization	0.0075*	(0.0011)	332,975	0.0840	0.5% winsorization
1% winsorization	0.0073*	(0.0010)	332,975	0.0838	1% winsorization (baseline)
2% winsorization	0.0071*	(0.0010)	332,975	0.0831	2% winsorization
5% winsorization	0.0062*	(0.0009)	332,975	0.0815	5% winsorization

6. Conclusion

This study utilizes the 2019 registration-based reform as a quasi-natural experiment to systematically examine the impact of this major institutional change on the multifactor models. The primary conclusions that emerged from this study are as follows:

This reform resulted in a substantial enhancement of the R² of multifactor models. However, this increase was accompanied by an increase in α , thereby unveiling the intricate nature of the reform's repercussions. This is evidenced by the coexistence of enhanced disclosure quality and market learning costs.

Secondly, disclosure quality serves as a pivotal transmission channel for the reform's impact on α . The mediating effect accounts for 89.30% of the total effect, thereby indicating that the reform primarily exerts its influence on pricing efficiency by means of disclosure quality.

Thirdly, the reform resulted in a substantial decrease in the frequency with which pricing errors were rectified. The half-life increased from 2.42 months (approximately 73 days) to 3.51 months (approximately 105 days), indicating a 45% increase (1.09 months). This finding indicates that the prolonged rectification of pricing inaccuracies invariably results in the buildup of pricing errors.

The contributions of this study are primarily reflected in three aspects: first, the expansion of the extant literature on asset pricing from the perspective of institutional dependence; second, the deepening of the literature on registration-based reform by revealing the mediating role

of disclosure quality; and third, the supplementation of disclosure theory by identifying the trade-off between information quality and information efficiency.

This study is subject to the following limitations: the sample period covers only 5.5 years following the reform, representing a medium-to-short-term effect; and the analysis of mechanisms focuses solely on the quality of information disclosure. Future research endeavors could entail conducting long-term tracking tests, exploring multi-channel transmission mechanisms, and undertaking cross-country comparisons.

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