Listing-Standard Choice and Post-IPO Innovation Capability of STAR Market Firms

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Abstract. China's STAR Market (Sci-Tech Innovation Board) has innovatively introduced a multi-track listing regime-most notably by allowing loss-making firms to go public-which plays an important role in enabling capital markets to better serve the real economy and to foster innovation-driven development. This study is the first to focus specifically on STAR Market IPO applicants that simultaneously satisfy both the profit criteria and the non-profit criteria, and to examine how their listing-standard choice affects post-IPO innovation capability. Our main findings show that, among firms eligible under both the profit criteria and the non-profit criteria, those that choose to list under the non-profit criteria exhibit stronger post-IPO innovation capability, reflected in higher innovation investment and greater innovation quality. Further analyses suggest that firms listing under the non-profit criteria resemble high-growth reinvestment firms: after going public, they allocate more cash flows to human capital and knowledge capital, rather than distributing earnings through cash dividends. This study not only advances the academic literature on China's registration-based IPO reform and firms' IPO behavior, but also provides policy-relevant insights for the Party and the state in fully implementing the registration-based issuance system and in pursuing a distinctive path of financial development with Chinese characteristics.

Keywords: STAR Enterprises, Registration System, Profit Criteria, Non-profit Criteria, Listing Standard Choice

1. Introduction

China's capital market is the world's largest emerging market, and the transition toward a registration-based IPO system represents one of the most consequential institutional reforms in the new era. As a primary "testing ground" for this reform, the STAR Market (Sci-Tech Innovation Board) has innovatively introduced more inclusive listing standards - most notably by permitting loss-making firms to go public for the first time - thereby creating both opportunities and challenges for high-tech enterprises seeking high-quality development through capital-market financing. Unlike the historical "three-year continuous profitability" requirement on the main board, STAR adopts five listing tracks with different thresholds. Only one track imposes an explicit net-profit requirement (profit criteria), whereas the other tracks permit pre-profit or loss-making firms to list when they meet alternative benchmarks such as market value, revenue scale, R&D intensity, or operating cash flows (non-profit criteria).

An IPO is a discrete, high-stakes event in a firm's life cycle. Listing can broaden financing channels, improve visibility in product and talent markets, and strengthen reputational capital. Failure, by contrast, can turn preparation costs into sunk losses and make subsequent re-entry to the IPO market harder [1,2]. For firms that satisfy both the profit and non-profit criteria ex ante, the STAR Market regime creates real managerial discretion: the firm must choose a track, and that choice can shape how external stakeholders interpret the firm's strategy and where post-IPO resources are deployed.

Because the STAR Market is intended to serve innovation-driven development and to cultivate "specialized, sophisticated, distinctive, and innovative" enterprises, it is important to assess whether the multi-track design delivers its intended economic consequences. We therefore ask a micro-level question: among dual-eligible firms, does choosing the non-profit criteria correspond to a more innovation-oriented post-IPO development path? By linking listing-track choice to subsequent R&D and patent outcomes, the study speaks to the effectiveness of registration-based IPO reforms and to how firms strategically position themselves under differentiated listing standards.

Table 1. Comparison of listing criteria (financial criteria) between the approval-based main board and the registration-based STAR market

	Panel A:STAR Market Non-profit Criteria
Criterion 2	Market value of RMB 1.5 billion + operating revenue of RMB 200 million in the most recent year + cumulative R&D investment over the past three years accounting for at least 15% of cumulative operating revenue over the same period.
Criterion 3	Market value of RMB 2.0 billion + operating revenue of RMB 300 million in the most recent year + net cash flows from operating activities of RMB 100 million over the past three years.
Criterion 4	Market value of RMB 3.0 billion + operating revenue of RMB 300 million in the most recent year.
Criterion 5	Market value of RMB 4.0 billion + firms whose core business or products have obtained relevant national approvals, with substantial market potential and demonstrated interim achievements.
	Panel B:STAR Market Profit Criteria
Criterion 1	Market value of RMB 1.0 billion, and either: (1) positive net profit in each of the past two years with cumulative net profit of no less than RMB 50 million; or (2) positive net profit in the most recent year and operating revenue of no less than RMB 100 million.
	Panel C:Main Board Listing Criteria Under the Approval-Based Regime
Criterion	Positive net profit in each of the past three fiscal years with cumulative net profit exceeding RMB 30 million; cumulative net cash flows from operating activities exceeding RMB 50 million over the past three fiscal years, or cumulative operating revenue exceeding RMB 300 million over the same period; pre-IPO total share capital of no less than RMB 30 million; the ratio of intangible assets to net assets at the end of the most recent period not exceeding 20%; and no uncovered losses as of the end of the most recent period.

2. Theoretical analysis and research hypothesis

When a firm is eligible for both tracks, selecting the non-profit criteria is not simply a fallback option; it can be a deliberate way to frame the firm as an innovation-first organization. Under legitimacy theory, actions that fit the expectations embedded in a focal institution improve a firm's ability to secure key resources—capital, talent, and information—and to operate under a more supportive external evaluation environment [3]. In the STAR Market context, the non-profit criteria place greater weight on technological capability and growth potential, which may increase

stakeholders' tolerance for short-term earnings volatility and, in turn, encourage longer-horizon innovation investments.

First, we expect higher innovation input for dual-eligible firms that list under the non-profit criteria. Innovation spending is long-horizon and risky, and it is more likely to be sustained when firms face fewer incentives to manage for near-term profits [4]. By down-weighting contemporaneous profitability and emphasizing R&D-related indicators, the non-profit criteria can reduce short-term performance pressure and the temptation to cut R&D to meet earnings targets [5]. In addition, investors and regulators tend to demand richer disclosure about R&D activities and technological progress for such issuers, which can strengthen external monitoring and increase the salience of innovation investment [6]. These considerations motivate the following hypothesis:

H1: Conditional on satisfying both the profit criteria and the non-profit criteria, firms that choose the non-profit criteria exhibit greater post-IPO innovation investment.

Second, we expect higher innovation quality. STAR Market disclosure rules make innovation outcomes more observable—for example, they require detailed disclosure of core technical personnel, which facilitates benchmarking across issuers. Choosing the non-profit criteria may also signal willingness to pursue projects with longer cycles and higher uncertainty, where the payoff is more likely to take the form of hard-to-imitate, technologically substantive innovations. In contrast, listing under the profit criteria may keep managerial attention closer to short-term earnings delivery, potentially discouraging exploratory projects. Taken together, we predict stronger post-IPO innovation quality for non-profit-criteria issuers [7]. We therefore state:

H2: Conditional on satisfying both the profit criteria and the non-profit criteria, firms that choose the non-profit criteria exhibit higher post-IPO innovation quality.

3. Research design

3.1. Sample selection and data sources

Our sample consists of firms whose IPOs were approved on the STAR Market from its launch on July 22, 2019 through December 31, 2024. The sample construction procedure is as follows: (1) We begin with 588 firms listed on the STAR Market within the above period; (2) To mitigate potential systematic bias, following Du et al. (2013), we exclude firms that were not first-time IPO applicants, yielding a sample of 560 firms; (3) Using pre-IPO financial information from the CSMAR database as the baseline, we manually review IPO prospectuses disclosed on the official website of the Shanghai Stock Exchange and hand-collect key financial variables to construct a comprehensive pre-IPO financial database; (4) We then manually benchmark each firm against the STAR Market listing standards on an item-by-item basis, and exclude firms that satisfy only the profit criteria or only the non-profit criteria prior to listing. This procedure results in a final sample of 291 IPO-approved firms, comprising 1,173 firm-year observations.

Regarding other data sources, patent data are obtained from the enterprise patent database of the China National Intellectual Property Administration (CNIPA). Additional financial variables for STAR Market firms are sourced from the CSMAR and WIND databases. To alleviate the influence of outliers, all continuous variables are winsorized at the 1st and 99th percentiles.

3.2. Model setting and variable definition

To examine the effect of STAR Market listing-standard choice on firms' post-IPO development quality and effectiveness, we estimate the following regression model:

$$Y_{i,t} = \alpha + \beta_1 \text{NONPROFIT}_i + \gamma X_{i,t} + \varepsilon_{i,t} \tag{1}$$

where Y includes two sets of dependent variables capturing firms' innovation capability. First, we proxy innovation input using (i) the natural logarithm of R&D expenditures (LNRD), (ii) the ratio of R&D expenditures to total assets (RDASSET), and (iii) the ratio of R&D expenditures to operating revenue (RDSALE).

Second, we measure patent quality using the "knowledge breadth" approach [8], separately constructed for (i) the quality of patent applications and (ii) the quality of granted patents. Specifically, patents differ in the International Patent Classification (IPC) codes they contain. For example, one patent may include three IPC codes - A01B02/00, A01B02/10, and A01B02/20 - while another patent also contains three IPC codes - A01B02/00, A02B13/00, and B35D13/20. Although the two patents have the same number of IPC codes, the former is concentrated within the single broad IPC group A01B02, whereas the latter spans three different broad groups (A01B02, A02B13, and B35D13). The latter thus integrates knowledge from a wider range of technological fields and is therefore regarded as higher-quality innovation output. Accordingly, we construct a Herfindahl-Hirschman Index (HHI)-based measure at the broad-group level to weight IPC information, and define patent knowledge breadth as:

$$\text{PATENT}_{nt,type} = 1 - \sum \alpha^2 \tag{2}$$

where α denotes the share of IPC codes belonging to each broad IPC group. A larger value of $\text{PATENT}_{nt,type}$ indicates greater dispersion across broad IPC groups - that is, broader knowledge inputs used in patent creation - and thus higher patent quality.

The key explanatory variable NONPROFIT captures firms' listing-standard choice on the STAR Market. For firms that satisfy both the profit criteria and the non-profit criteria prior to listing, NONPROFIT equals 1 if the firm ultimately chooses to list under the non-profit criteria, and 0 otherwise.

In addition, X is a vector of control variables selected based on the existing literature. Specifically, first, with respect to firms' financial characteristics, we control for firm size (SIZE), leverage (LEV), return on assets (ROA), and sales growth (SALEGROW). Second, regarding corporate governance characteristics, we control for firm age (AGE), board size (BOARD), the proportion of independent directors (INDEP), the ownership stake of the largest shareholder (TOP1), and whether the firm engages a Big Four international accounting firm (BIG4). The regression specification includes industry, region, and year fixed effects to control for industry-, location-, and time-specific heterogeneity, and standard errors are clustered at the industry level.

4. Empirical results and analysis

4.1. Descriptive statistical analysis

Table 2 reports the descriptive statistics for the main variables. With respect to the key explanatory variable, the mean of NONPROFIT is 0.165, implying that among firms that satisfy both the profit criteria and the non-profit criteria, approximately 16.5% ultimately choose the non-profit criteria and successfully go public.

Table 2. Descriptive statistics

Variables	Ob.	Mean	SD	Min	Median	Max

LNRD	1173	18.786	0.997	16.492	18.655	22.655
RDASSET	1173	0.050	0.036	0.001	0.038	0.280
RDSALE	1173	0.147	0.139	0.004	0.103	1.272
APPLY_PA	833	0.138	0.155	0.009	0.094	1.000
GRANT_PA	833	0.167	0.198	0.003	0.099	1.000
NONPROFIT	1173	0.165	0.371	0.000	0.000	1.000
SIZE	1173	22.005	0.857	20.544	21.855	25.223
LEV	1173	0.275	0.171	0.036	0.232	0.714
ROA	1173	0.046	0.059	-0.150	0.499	0.236
SALEGROW	1173	0.168	0.343	-0.618	0.139	1.647
AGE	1173	2.744	0.386	1.609	2.773	3.584
BOARD	1173	2.085	0.186	1.609	2.197	2.708
INDEP	1173	0.376	0.050	0.286	0.364	0.667
TOP1	1173	0.311	0.138	0.094	0.285	0.733
BIG4	1173	0.100	0.300	0.000	0.000	1.000

4.2. Basic empirical results

Table 3 reports the regression results on the effect of listing-standard choice on firms' post-IPO innovation capability. On the one hand, with respect to innovation input, the coefficients on NONPROFIT in Columns (1) - (3) are all significantly positive, indicating that among firms eligible under both criteria, those that list under the non-profit criteria invest more in innovation after going public. On the other hand, regarding innovation quality, the coefficients on NONPROFIT in Columns (4) and (5) are significantly positive at the 1% level, suggesting that, conditional on meeting both criteria, firms listing under the non-profit criteria achieve higher post-IPO innovation quality. These findings provide empirical support for the theoretical framework on the economic consequences and underlying mechanisms of listing-standard choice under the STAR Market's registration-based regime, and thus corroborate Hypotheses H1 and H2.

Table 3. Basic empirical results

	LNRD	RDASSET	RDSALE	APPLY_PA	GRANT_PA
Variables	(1)	(2)	(3)	(4)	(5)
NONPROFIT	0.249*	0.019**	0.080***	0.054***	0.086***
	(0.096)	(0.012)	(0.001)	(0.001)	(0.001)
SIZE	0.809***	-0.010***	-0.015*	-0.038***	-0.058***
	(0.001)	(0.001)	(0.083)	(0.010)	(0.001)
LEV	0.518**	0.018*	-0.202***	-0.019	-0.049
	(0.022)	(0.076)	(0.001)	(0.654)	(0.231)
ROA	-0.026	-0.041	-0.971***	0.326**	0.387***

Table 3. (continued)

	(0.925)	(0.103)	(0.001)	(0.017)	(0.006)
SALEGROW	0.049	0.005***	0.022*	-0.013	-0.012
	(0.292)	(0.004)	(0.051)	(0.213)	(0.301)
AGE	0.025	0.001	0.013**	-0.034*	-0.024
	(0.747)	(0.732)	(0.031)	(0.062)	(0.196)
BOARD	-0.164	-0.009	-0.032	-0.010	-0.054
	(0.625)	(0.646)	(0.528)	(0.747)	(0.276)
INDEP	-1.157	-0.049	-0.270*	-0.070	0.102
	(0.149)	(0.255)	(0.058)	(0.538)	(0.634)
TOP1	-0.086	-0.003	-0.032	0.019	-0.066
	(0.683)	(0.751)	(0.262)	(0.773)	(0.236)
BIG4	0.314***	0.017**	0.051*	-0.022	-0.005
	(0.006)	(0.013)	(0.083)	(0.234)	(0.861)
CONSTANT	1.212	0.269***	0.662***	1.008***	1.550***
	(0.352)	(0.001)	(0.008)	(0.001)	(0.001)
AREA	Yes	Yes	Yes	Yes	Yes
INDUSTRY	Yes	Yes	Yes	Yes	Yes
YEAR	Yes	Yes	Yes	Yes	Yes
N	1173	1173	1173	833	833
R^2	0.688	0.272	0.452	0.093	0.125

Notes: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. P-values are reported in parentheses. The same applies below.

5. Further analyses

We further examine how firms listed under different criteria allocate capital after going public. First, we measure capital renewal using the ratio of cash paid for the purchase of fixed assets, intangible assets, and other long-term assets in the statement of cash flows to total assets (FIXED_ASSET) [9]. Second, we manually screen the detailed components of intangible assets. Specifically, an item is classified as R&D-related intangible assets if its description contains R&D-related keywords such as "software," "trademark," or "technology," as well as patents associated with these items. We use the ending balance of such items to capture firms' investment in R&D-related intangibles. We then aggregate this amount within each fiscal year and scale it by total intangible assets to construct RD_INTANGIBLE, which reflects the importance of knowledge capital [10].

Table 4 reports the regression results. The coefficients on NONPROFIT in Columns (1) and (2) are both significantly positive, indicating that among firms eligible under both criteria, those that choose and successfully list under the non-profit criteria exhibit higher investment levels and place greater emphasis on knowledge capital. Accordingly, these firms allocate more funds to capital upgrading and rely on R&D and knowledge capital to support valuation and build competitive barriers. Taken together, the evidence suggests that non-profit criteria issuers resemble high-growth reinvestment firms: after listing, they are more likely to channel cash flows into human capital and knowledge capital rather than distributing earnings through cash dividends.

Table 4. Further analyses

Variables	FIXED_ASSET (1)	RD_INTANGIBLE (2)
NONPROFIT	0.008**	0.167***
	(0.047)	(0.001)
CONTROLS	Yes	Yes
AREA	Yes	Yes
INDUSTRY	Yes	Yes
YEAR	Yes	Yes
N	1173	1158
R^2	0.113	0.278

6. Conclusion

This paper examines STAR Market firms that are eligible under both the profit criteria and the non-profit criteria and studies whether their listing-track choice is informative about post-IPO innovative capacity. The evidence indicates that, within this dual-eligible set, firms choosing the non-profit criteria invest more in R&D and generate higher-quality patents after listing. Further analyses suggest that these firms behave like reinvestment-oriented growth issuers, channeling more funds toward human capital and knowledge capital rather than paying out cash dividends. Taken together, the findings imply that the non-profit criteria track can serve as a substantive strategic choice—consistent with the STAR Market's innovation mandate—rather than a purely procedural alternative. A natural direction for future work is to examine longer-run outcomes (e.g., labor-market effects) and to explore how investor attention and regulatory review interact with firms' track choice.

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