Quantifying and Comparing Disclosure Quality of Chinese and US-based Firms Listed in the US: A Matched Sample Analysis

XICHENG HUANG[1]*, HAOQIN TANG[2], YUTAI LU[3]

[1]Faculty of Business Administration, University of Macau, Macau, 999078, Macau SAR (China)
[2]Chongqing Nankai Secondary School, Chongqing, 400038, China
[3]Shanghai Guanghua Cambridge International School, Shanghai, 200093, China

Abstract

This paper investigates the differences in disclosure quality between US and Chinese companies listed on US stock exchanges. We applied the disclosure scoring model "DSCORE" based on the framework by Botosan (1997) to quantify disclosure quality. The model divides disclosure quality into five dimensions of disclosure: background information, historical summaries, key non-financial statistics, projected information, and management discussion and analysis (MD&A). Points are awarded for the level of detail provided in each category. The paper concludes critical factors leading to convergence of reporting quality between firms listed on the same exchanges regardless of nationality.

1 INTRODUCTION

The disclosure level of annual reports provides essential information to investors for valuation and analysis. However, cultural, regulatory, and management differences between companies from different countries may affect disclosure practices.

Chinese companies listed on U.S. stock exchanges (NYSE, NASDAQ, etc.) must comply with the same disclosure and financial reporting rules as that required for U.S. companies listed on the same stock exchanges. Thus, since these companies must follow the same rules, they should have

---

*Corresponding author. Email: bb90685@um.edu.mo

similar disclosure and accounting quality. However, it is also plausible that US regulators' different pressure (higher for local companies and lower for foreign companies), cultural differences, management style and other factors lead to differences in reporting quality because managers from these two countries use the rule of disclosure in the GAAP in a different manner. For example, US regulators may pay more attention to US-based companies and less attention to foreign companies (including Chinese companies) since regulators are closer to local companies. Whether there are differences between the disclosure quality of US-based and Chinese companies? Why they are different (or similar) is not the focus of our research; we focus on whether they are different.

Within one industry, there are already many research papers to investigate their disclosure quality. For example, Bourveau, De George, Ellahie, and Macciocchi (2022) studied disclosure qualities of initial coin offerings of blockchain companies in an unregulated capital market. Botosan (1997) focused her research on the Mechanical industry. Malone, Fries, and Jones (1993) investigated the disclosure problem in the oil and gas industry. Different industries may have different disclosure styles; for example, reports of medicine companies usually disclose more information about research than companies of other industries (Botosan, 1997). To generalise our result, we selected ten companies and divided them into five groups as the sample. Within one set, there are two companies, one US one and another Chinese one. They're comparable in size, growth, and industries. We investigated disclosure details on the annual reports of these ten companies. Since companies listed on US exchanges (like NASDAQ or NYSE) follow the same accounting rule (GAAP), their disclosure should be comparable.

The sample comprises five matched groups of companies, with each group containing one US and one Chinese firm in the same industry and of comparable size and growth. Annual reports for the 2022 fiscal year are analysed to compute DSCOREs. The mean DSCORE is higher for Chinese firms than for US firms, but the difference is not statistically significant in a regression analysis. This suggests disclosure quality is similar between US and Chinese companies listed in the US once strict SEC requirements are applied. Regulatory scrutiny, compliance with US GAAP, and access to US information intermediaries may offset disclosure incentives faced by foreign firms.

Disclosure quality is not a quantitative indicator, so quantifying it is the second step of our research. Botosan (1997) proposed a method to evaluate disclosure details of annual reports (usually

10-K for companies listed on US exchanges), and every detail won 1 to 3 scores. Summing up every detail's score is the final score of the disclosure quality; we call it "DSCORE", which means the disclosure score of a company. The point of computing DSCORE is in the main body.

2 ASSUMPTIONS

Our several critical assumptions are as follows:

1. Within one group, companies should be comparable in size, growth, and industries. Sizes of companies mean different pressures from regulators, bargaining power, scale of economy, etc. Large companies are different from smaller companies in every aspect. Besides, growth is also related to specific strategies of companies, which will affect disclosure quality. Finally, the industry significantly impacts disclosure; for example, medical companies usually disclose more information than companies in other industries. We must ensure that every group's two companies are in the same or similar industries.

2. Use the market value of 2 points of time, at the beginning of 2022 (31-12-2021) and the end of this year (30-12-2022), to represent the company's size, use market value growth rate from 31-12-2021 to 30-12-2022 to represent company's growth.

3. Companies within a group, their differences in market values of both points of time within 50%, the difference in market value growth rates between these two points of time is within 100% and with the same direction (both grow or decline), and similar industries. Thus, we deem that these two companies are "comparable".

4. If two companies' sic codes are the same or at least their first three digits are the same, they are considered in similar industries. Determining a company's industry by guessing is unreliable. SIC code (Standard Industrial Classification) is the US government's classification of US companies and US-listed foreign companies. If the first three digits of the sic code of both companies are the same, it can be assumed that they are in the same industrial category.

5. We will use a disclosure index to represent the quality of a company's disclosure. Items included in this index reflect five categories of information that investors and financial analysts find helpful in investing. According to Botosan (1997), each company's disclosure score (DSCORE)

is computed by summing the points awarded across the five disclosure categories. Our disclosure index is also called "DSCORE"; each category's score is defined as "SCORE".

6. We define the nationalities of companies as X and DSCORE as Y. About the companies' nationality, US=0, China=1. The only independent variation is the nationality since we excluded other variations by selecting similar companies. "China" will also be spelt as "CN" when doing regression analysis in the following research.

7. Our hypothesis: Chinese and US companies listed in US exchanges differ in their disclosure index (DSCORE). This is the computing process of DSCORE, in line with the approach of Botosan (1997), except for some differences. We will introduce our DSCORE computing methods in the following part.

3 EMPIRICAL ANALYSIS

3.1 Sample

3.1.1 Sample selection

The sample is essential. We selected ten companies, 5 US and 5 Chinese companies, then they will be divided into five groups like this:

Group 1: Intellia Therapeutics (sic code 2835) & Zai Lab (sic code 2834)

The first group is two companies from the pharmaceutical industry.

Group 2: GCM Grosvenor (sic code 6282) & NOAH (sic code 6282)

This group is two financial companies that share one sic code.

Group 3: Canoo (sic code 3714) & Niu Technology (sic code 3711)

Two electric vehicle companies they're slightly different but within one industry.

Group 4: Skyworks Solution (sic code 3674) & UMC (sic code 3674)

Two semiconductor companies make different products. However, since they have the same sic code, they're comparable in the industry dimension. It is worth mentioning that UMC is not located in Mainland China, but since we focus on Chinese companies rather than just "Mainland

Table 1: Group 1's difference in market value and growth rate.

	Intellia Therapeutics	Zai Lab	Difference
Market value 31-12-2021	US$8,799,000,000	US$6,059,000,000	45.22%
Market value 30-12-2022	US$2,974,000,000	US$3,006,000,000	1.08%
Growth rate (%)	-66.20%	-50.39%	31.38%

Table 2: Group 2's difference in market value and growth rate.

	GCM Grosvenor	Noah	Difference
Market value 31-12-2021	US$1,977,000,000	US$1,875,000,000	5.44%
Market value 30-12-2022	US$1,419,000,000	US$970,000,000	46.29%
Growth rate (%)	-28.22%	-48.27%	71.01%

China" companies, it's acceptable.

Group 5: nLight (sic code 3674) & Canaan (sic code 3674)

Another group with two semiconductor companies. Though two groups share the same industry, it is acceptable.

3.1.2 Sample's validity

The following are differences in market value and growth rate between 2 companies within a group.

Then, we'll discuss the DSCORE computation. The tool is from Botosan (1997).

3.2 DSCORE Computation

3.2.1 DSCORE categories

The scoring criteria can be divided into five categories.

I. Background Information

Table 3: Group 3's difference in market value and growth rate.

	Canoo	Niu Technology	Difference
Market value 31-12-2021	US$1,819,000,000	US$1,229,000,000	48.01%
Market value 30-12-2022	US$420,000,000	US$402,000,000	4.48%
Growth rate (%)	-76.91%	-67.29%	14.30%

Table 4: Group 4's difference in market value and growth rate.

	Skyworks solution	UMC	Difference
Market value 31-12-2021	US$25,658,000,000	US$29,211,000,000	13.85%
Market value 30-12-2022	US$14,595,000,000	US$16,301,000,000	11.69%
Growth rate (%)	-43.12%	-44.20%	2.50%

Table 5: Group 5's difference in market value and growth rate.

	nLight	Canaan	Difference
Market value 31-12-2021	US$1,052,000,000	US$880,000,000	19.55%
Market value 30-12-2022	US$459,000,000	US$326,000,000	40.80%
Growth rate (%)	-56.37%	-62.95%	11.68%

Statement of corporate goals or objectives

Barriers to entry

Competitive environment

General description of the business

Principle products

Principle markets

Subtotals ($SCORE_{1j}$)

II. Ten- or Five-Year Summary of Historical Results:

Return-on-assets or sufficient information to calculate return-on-

assets (i.e., net income, tax rate, interest expense and total assets)

Net profit margin or adequate information to calculate net profit margin (i.e., net income, tax rate, interest expense and sales)

Asset turnover or sufficient information to compute asset turnover (i.e., sales and total assets)

Return-on-equity or adequate information to calculate return-on-equity (i.e., net income and stockholders' equity)

Summary of sales and net income for most recent eight quarters

Subtotals ($SCORE_{2j}$)

III. Key Non-Financial Statistics:

Employee Number

Average compensation per employee

Order backlog

Percentage of sales for products designed in the last five years.

Market shares

Numbers of units sold.

Unit price.

Growth in number of units sold.

Subtotals ($SCORE_{3j}$)

IV. Projected Information:

Projected market share.

Projected cash flow

Projected capital expenditures and R&D expenditure

Projected profit

Projected sales

Subtotals ($SCORE_{4j}$)

V. Management Discussion and Analysis (MD&A)

Sales changes

Operating income changes

The cost of goods sold changes.

Gross profit changes

Selling and administrative expenses changes

Interest expense or interest income changes.

Net income changes

Inventory changes

Accounts receivable changes

Capital expenditures or R&D changes.

Market share changes

Subtotals ($SCORE_{5j}$)

3.2.2 Explanation of scoring of different categories

3.2.2.1 Key Non-Financial Statistics

This category includes non-financial metrics like market share, units sold, order backlog, etc. These provide supplemental business insights beyond the financial statements. The scoring awards 2 points for each critical non-financial statistic disclosed in the annual report.

3.2.2.2 Projected Information

This category contains management's forecasts for future performance, such as projected sales, profits, investments, etc. These convey valuable information about the company's opportunities and risks. The scoring gives 2 points for directional outlooks (e.g., profit will increase) and 3 points for quantitative forecasts that provide specific numbers or ranges.

3.2.2.3 Management Discussion and Analysis (MD&A)

The MD&A section explains year-over-year changes in critical financial and non-financial indicators within or without the financial statements. This provides valuable analysis not found (or not directly found) in the financial statements. The scoring gives 1 point for each management discussion and an additional score if the number cannot be computed from financial statements.

3.2.2.4 DSCORE formula

The overall DSCORE sums the points across all categories to derive a comprehensive disclosure quality score for each company:

$$DSCOR_j = \sum_{i=1}^{5} SCORE_{ij} \qquad (1)$$

Note: "i" means the category, while j means the company.

This approach rewards firms that provide more robust disclosures across valuable categories for investors and analysts. The total score reflects the breadth and depth of disclosure in the annual

Table 6: DSCORE of selected ten companies

	Intellia	GCM	Canoo	Skyworks	nLight	Zai Lab	Noah	Niu	UMC	Canaan
DSCORE	14	17	32	27	19	14	25	31	29	11
US/CN	US	US	US	US	US	CN	CN	CN	CN	CN

report.

3.2.3 DSCORE of selected companies

3.3 Results

The table below is our regression result. We have mentioned that we defined nationality (China or US) as our independent variable and DSCORE as the dependent variable.

The regression analysis examines whether there is a significant difference in disclosure score (DSCORE) between US and Chinese companies listed on US exchanges. The independent variable is a nationality indicator, with US = 0 and China = 1. By selecting samples, we have excluded sizes, growth rates and industry as variables.

The regression coefficient on the China indicator is 0.200 with a standard error of 5.229 (Table 8). This coefficient suggests Chinese firms have a higher DSCORE on average by 0.2 points compared to US firms. However, the p-value is far above conventional significance levels, indicating that this difference is not statistically significant.

The R-squared of the regression is approximately zero, meaning nationality alone explains none of the variation in disclosure scores. This aligns with the finding of no significant difference between US and Chinese firms' DSCOREs.

The results show that Chinese companies listed on US exchanges do not have significantly higher or lower disclosure quality than matched US companies. This holds when controlling for industry, size, and growth differences through the paired sampling approach.

The lack of significance could be driven by several factors that encourage information transparency from both US and Chinese firms:

1. All US-listed companies must comply with strict SEC disclosure regulations and US GAAP standards.

Table 7: DSCORE computing details of selected ten companies.

	Intellia	GCM	Canoo	Skyworks	nLight	ZLAB	Noah	Niu	UMC	Canaan
I. Background Information										
Statement of corporate goals or objectives	1	0	1	1	1	1	1	1	1	0
Barriers to entry	0	0	1	1	0	0	1	1	1	1
Competitive environment	1	1	1	1	1	0	1	1	1	1
General description of the business	1	1	1	1	1	1	1	1	1	1
Principle products	1	1	1	1	1	1	1	1	1	1
Principle markets	0	1	1	0	1	1	1	0	1	1
Subtotal:		4	6	5	5	4	6	5	6	5
II. Ten- or Five-Year Summary of Historical Results:										
Return-on-assets or sufficient information to compute return-on-assets (i.e., net income, tax rate, interest expense and total assets)	0	0	0	0	0	0	0	0	0	0
Net profit margin or sufficient information to compute net profit margin (i.e., net income, tax rate, interest expense and sales)	0	0	0	0	0	0	0	0	0	0
Asset turnover or sufficient information to compute asset turnover (i.e., sales and total assets)	0	0	0	0	0	0	0	0	0	0
Return-on-equity or sufficient information to compute return-on-equity (i.e., net income and stockholders' equity)	0	0	0	0	0	0	1	0	0	0
Summary of sales and net income for most recent eight quarters	0	0	1	1	0	0	0	0	0	0
Subtotal:	0	0	1	1	0	0	1	0	0	0
III. Key Non-Financial Statistics:										
Employee number	0	2	2	2	2	0	2	2	2	2
ii. Average compensation per employee	0	0	0	2	0	0	0	2	0	0
iii. Order backlog	0	0	0	0	2	0	2	2	0	0
iv. Percentage of sales for products designed in the last five years	0	0	2	0	0	0	0	0	0	0
v. Market shares	0	0	2	2	0	0	2	2	2	0
vi. Number of units sold	0	0	2	2	0	0	0	2	2	2
vii. Unit price	0	0	2	0	0	0	0	2	2	2
viii. Growth in the number of units sold	0	0	2	2	0	0	0	2	2	
Subtotal	0	2	12	10	4	0	6	14	10	6
IV. Projected Information:										
i. Projected market share	0	0	2	0	0	0	0	2	0	0
ii. Projected cash flow	0	0	0	0	0	0	0	0	0	0
iii. Projected capital expenditures and R&D expenditure	0	0	0	0	0	0	2	0	2	0
iv. Projected profits	0	0	0	0	0	0	0	0	0	0
v. Projected sales	0	0	0	0	0	0	0	0	0	0
Subtotal	0	0	2	0	0	0	2	2	2	0
V. Management Discussion and Analysis										
i. Sales changes	1	1	1	1	1	1	1	1	1	0
ii. Operating income changes	1	1	1	1	1	1	1	1	1	0
iii. Cost of goods sold changes	1	1	1	1	1	1	1	1	1	0
iv. Gross profit changes	1	1	1	1	1	1	1	1	1	0
v. Selling and administrative expenses changes	1	1	1	1	1	1	1	1	1	0
vi. Interest expense changes or interest income changes	1	1	1	1	1	1	1	1	1	0
vii. Net income changes	1	1	1	1	1	1	1	1	1	0
viii. Inventory changes	1	1	1	1	1	1	1	1	1	0
ix. Accounts receivable changes	1	1	1	1	1	1	1	1	1	0
x. Capital expenditures or R&D changes	1	1	1	1	1	1	1	1	1	0
xi. Market share changes	0	1	1	1	0	0	0	0	1	0
Subtotal	10	11	11	11	10	10	10	10	11	0
DSCORE	14	17	32	27	19	14	25	31	29	11
CN/US (US=0, CN=1)	0	0	0	0	0	1	1	1	1	1

Table 8: Group 2's difference in market value and growth rate.

VARIABLES	(1) score
CN	0.200
	(5.229)
Constant	21.80***
	(3.697)
Observations	10
R-squared	0.000

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

2. Oversight from US information intermediaries like financial analysts.

3. Regulator incentives to scrutinise foreign firms thoroughly.

4. Reputational motivations to signal credibility through transparency. The findings suggest that listing location may override home country norms in shaping disclosure quality. Adopting the expectations and practices of US capital markets converges reporting behaviour between firms of different national origins.

While this study focuses specifically on Chinese and US companies, the results highlight how the institutional environment influences corporate transparency. The disclosure score methodology can be leveraged to analyse reporting behaviour across various contexts.

4 CONCLUSION

This study develops a disclosure scoring model, DSCORE, to quantify and compare US and Chinese companies' disclosure quality on US exchanges. The matched sample of 5 US and 5 Chinese firms controls for industry, size, and growth differences. Scoring annual reports across five disclosure categories finds no significant difference between the overall disclosure quality of US and Chinese companies.

While cultural and regulatory incentives may differ, all companies listed in the US must comply with SEC disclosure rules and US GAAP accounting standards. The lack of difference in DSCOREs suggests that compliance with the same accounting standards can override disclosure

tendencies. Regulators also likely scrutinise foreign listed firms, motivating full disclosure.

Information intermediaries like analysts provide reporting oversight for US investors. This reduces information asymmetry, which could otherwise incentivise lower disclosure by foreign firms. Adopting practices promoting transparency to US capital markets appears to shape disclosure quality more than home country norms.

The DSCORE methodology in this study provides a model for quantifying disclosure based on informativeness to investors. The scoring categories and allocation of points can be adjusted for different research questions. The lack of difference found for country of origin suggests that examining industry, size, and growth effects on disclosure incentives may be more meaningful than nationality alone.

Future research with larger samples can further test disclosure score differences across countries. The matched pair approach controls for confounding effects well but lacks power. Studies could also expand disclosure categories, weight them differently, or tailor scoring to specific industries. Overall, directly measuring disclosure provides advantages over relying on indirect proxies. Disclosure scoring models like DSCORE can deepen understanding of transparency quality.

While this study offers valuable insights into the disclosure quality of Chinese and U.S.-based companies listed in the U.S., it is crucial to recognise its limitations. The sample size of ten companies, though carefully selected for comparability in size, growth, and industry, could be more significant, limiting the statistical power and generalizability of the findings. Additionally, the study focuses on market leaders or well-performing companies from only four industries—semiconductors, electric vehicles, pharmacy, and finance. This selection introduces potential biases, as these companies may not adequately represent the diversity and complexity of the broader market. Another consideration is the DSCORE methodology, which, while adaptable, was not tested for variations in scoring categories or weighting, which could affect outcomes. Lastly, while attempts were made to control for industry, size, and growth, there may be unaccounted-for confounding variables such as governance structures, market conditions, or the timing of listings that could influence disclosure quality. Future research involving a larger, more diverse sample and additional variables can provide a more comprehensive understanding of disclosure practices across different contexts."

References

[1] Bourveau, T., De George, E. T., Ellahie, A., & Macciocchi, D. (2022). The Role of Disclosure and Information Intermediaries in an Unregulated Capital Market: Evidence from Initial Coin Offerings. Journal of Accounting Research, 60(1), 129-167

[2] Botosan, C.A. (1997) Disclosure Level and the Cost of Equity Capital. The Accounting Review, 72, 323-349.

[3] Malone, D., Fries, C., & Jones, T. (1993). An Empirical Investigation of the Extent of Corporate Financial Disclosure in the Oil and Gas Industry. Journal of Accounting, Auditing & Finance, 8(3), 249–273. https://doi.org/10.1177/0148558X9300800306

[4] Canaan Inc. (2022). Form 20-F [Annual report]. Retrieved from https://www.sec.gov/Archives/edgar/data/0001779480/000119312521103292/d148868d20f.htm.

[5] GCM Grosvenor Inc. (2022). Form 10-K [Annual report]. Retrieved from https://last10k.com/sec-filings/gcmg.

[6] Canoo Inc. (2022). Form 10-K [Annual report]. Retrieved from https://www.sec.gov/Archives/edgar/data/0001754825/000155837021003823/goev-20201231x10k.htm.

[7] nLight, Inc. (2022). Form 10-K [Annual report]. Retrieved from https://www.sec.gov/Archives/edgar/data/0001717556/000156459021009468/lasr-10k_20201231.htm.

[8] Niu Technologies (2022). Form 20-F [Annual report]. Retrieved from https://www.sec.gov/Archives/edgar/data/0001744781/000110465921047988/a20-39559_120f.htm.

[9] Noah Holdings Limited (2022). Form 20-F [Annual report]. Retrieved from https://www.sec.gov/Archives/edgar/data/0001499548/000110465921047987/a20-39558_120f.htm.

[10] Intellia Therapeutics, Inc. (2022). Form 10-K [Annual report]. Retrieved from https://www.sec.gov/Archives/edgar/data/0001652130/000165213021000008/a2020123110-k.htm.

[11] Skyworks Solutions, Inc. (2022). Form 10-K [Annual report]. Retrieved from https://www.sec.gov/Archives/edgar/data/0004127/000000412721000014/swks-20211001x10k.htm.

[12] United Microelectronics Corp (2022). Form 20-F [Annual report]. Retrieved from https://www.sec.gov/Archives/edgar/data/0001041668/000110465921047989/a20-39560_120f.htm.

[13] Zai Lab Limited (2022). Form 20-F [Annual report]. Retrieved from https://www.sec.gov/Archives/edgar/data/0001704292/000110465921047986/a20-39557_120f.htm.