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Can Digital Finance Accelerate the Digital Transformation of Companies? From the Perspective of M&A

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Abstract: Digital M&A, known as digital merger and acquisition, is a vital tool for companies to achieve digital transformation and play an essential role in sustainable development. Corporate digital M&A is inseparable from financial support. Therefore, based on the M&A data of Chinese A-share listed companies from 2011–2020, this paper systematically analyzes the impact effect of digital finance on corporate digital M&A in combination with the Peking University Digital Inclusive Finance Index. The results show that: (1) Digital finance development contributes to the implementation of digital M&A by enterprises, and the higher the level of development, the more likely enterprises are to engage in digital M&A. (2) Financing constraints and the innovation capacity play a partially intermediary role between digital finance and digital M&A. (3) Executive age and internal control negatively moderate the relationship between digital finance and digital M&A, and bank competition positively moderates the relationship. These research findings provide useful lessons for promoting digital M&A and accelerating digital transformation in enterprises.

Keywords: digital finance; digital M&A; financing constraints; innovation capacity; Chinese companies

1. Introduction

With the rapid change and widespread use of digital technology, human society is accelerating into the era of the digital economy. A study by International Data Corporation (IDC) [1] shows that by 2024, more than half of the global economy will be based on or influenced by digitalization, and more than 90% of businesses and organizations will make digital transformation the centerpiece of their growth strategy. Therefore, how to foster digital competitiveness and achieve sustainable economic development has become the focus of attention of countries [2]. In the process, China has become the fastest-growing economy for digital transformation worldwide. According to the data released by the China Academy of Information and Communication Technology, the total scale of China's digital economy has increased from 2.62 trillion in 2005 to 39.2 trillion in 2020, and the proportion of the total scale of the digital economy to GDP has increased from 14.2% in 2005 to 38.6% in 2020. The digital economy has become an important support for China's national economic development. "The 14th Five-Year" Plan and the 2022 government work report further emphasize the need to accelerate the development of the digital economy and strengthen the overall layout of China's digital construction [3]. The implementation of the digital strategy has boosted the endogenous power of business transformation, and more and more companies have started to join the wave of digital transformation.

However, digital transformation is related to the survival of companies and is not an easy task [4]. It faces the following three main challenges. First, the digital basis of businesses is insufficient and lacks relevant digital transforming experience. As the transformation ability is inadequate, companies fall into the dilemma of "not being able to transform". Second, digital transformation requires extensive capital investment, and companies lack sufficient capital supply. Due to the high cost of transformation, they face the predicament of "not having money to transform". Third, the digital transformation

process is more time-consuming and riskier [5]. The high uncertainty of transformation makes enterprises fall into the dilemma of "not daring to transform". Two main ways for companies to achieve digital transformation are self-built digital capabilities and M&A innovation. As the enterprises' digital transformation faces the above three challenges, most companies have a weak digital foundation and lack the relevant knowledge and supporting talent, making it time-consuming and difficult to develop digital capabilities internally. Therefore, digital M&A has become the priority and even the only choice for most enterprises in digital transformation [6]. M&A is the most rapid and effective growth strategy for companies and the highest response to rapid access to innovative resources in response to changes in the market environment [7]. In the era of the digital economy, M&A is taking on a new significance [8]. The development and implementation of digital M&A strategies that meet the needs of the times will play an "enabling" role in the digital transformation, effectively achieving integration and leapfrogging for both parties.

Based on the existing literature [9], we define digital M&A as mergers and acquisitions by companies to build the digital capabilities they need, primarily to acquire digital technologies and services or to capture digital markets. Since most enterprises lack a unified high-level digital transformation strategy and appropriate technology platforms and system design capabilities, it becomes complex and difficult to build their digital capabilities. Therefore, digital M&A has become a strategic choice for digital transformation for more and more enterprises. Compared to self-built digital capabilities, digital M&A has two major advantages: "fast" and "good". "Fast" means that digital M&A is the fastest and most direct way for companies to capture the market and gain users. They cannot only acquire digital technology quickly [10], but they can also prevent competitors from acquiring key digital capabilities [11]. "Good" means that digital M&A effectively solves the low attractiveness of traditional companies to technical talents and is beneficial to risk reduction and investment diversification. In addition, digital M&A has three major characteristics. (1) The urgency of M&A funding. According to Freshfields research, the average time to complete digital M&A is 24 days, less than 46 days for non-digital M&A [12]. Even at the high end of the market, where deals exceed $5 billion, digital M&A is more than seven weeks faster than non-digital M&A. Shorter M&A terms place greater demands on the timeliness of enterprise funding. (2) The scarcity of M&A experience. The research on digital M&A in academia remains at the level of only analyzing a certain industry or a specific case, and a holistic cognition of digital M&A is lacking. Meanwhile, most enterprises' digital transformation is more tortuous and lacks existing experience references. According to the Boston Consulting Group (BCG) [13], global digital M&A deals account for 24% of overall M&A and are mainly concentrated in the IT, healthcare, and broadcast media sectors. The lack of M&A experience makes it difficult for buyers to effectively assess the value of digital targets and thus pay higher M&A premiums. (3) The ease of transfer of M&A technology. Unlike other types of M&A, digital technologies and capabilities can be quickly built on existing foundations without owning and understanding all the necessary prior capabilities. For example, General Motors has leapfrogged to quickly become a strong participant in the intelligent automotive industry by acquiring Cruise, a startup in the self-driving space. PetSmart, a traditional retailer, became the fastest-growing online shopping platform by acquiring Chewy.com, an online pet supply retailer. The significant advantages of digital M&A have intensified competition in the market. In particular, there is no shortage of buyers for digital companies that bring their own user base [14]. Due to fierce competition, target valuations will have gone up, which puts even more financial pressure on acquirers.

In summary, there are both opportunities and challenges in digital M&A. Particularly, corporate digital M&A requires a large amount of capital investment, and its M&A process faces serious financing constraints. Although traditional financial institutions have provided financial support for digital M&A to a certain extent, they have also revealed a series of problems such as "mismatch between supply and demand", "insufficient credit" and "slow lending", which have become serious obstacles to the implementation of digital M&A. In recent years, digital finance has come into being with the profound combination of

digital technology and financial services. With the help of big data and the Internet, digital finance makes up for the shortcomings of the traditional financial system. It provides new solutions to ease the financial constraints of enterprises and optimize the allocation of financial resources [15]. Therefore, this paper explores the impact of digital finance on corporate digital M&A and its underlying mechanism, intending to find an effective realization path for accelerating the formation of a new development pattern in digital transformation. In order to test our conjecture, we constructed a dataset based on the scope of the passively merged company's operations to measure whether the deal was a digital M&A or not. Then, we used empirical research methods such as multiple regression analysis and mediating effect tests to reveal the specific effects and mechanisms of digital finance on digital M&A. The findings show that digital finance significantly facilitates companies' digital M&A. Managerial age, internal controls, and bank competition moderate this effect. In terms of the mechanism of action, digital finance can alleviate corporate financing constraints and promote corporate innovation, thereby influencing digital M&A.

The contribution will be reflected in the following aspects. First, it introduces digital finance into the analytic framework of micro-firm research and answers the key question of whether digital finance can become the driving force of corporate digital M&A from the financial perspective, which enriches and complements the existing literature on digital transformation and digital finance. Second, most of the current research on digital M&A by scholars stays at the level of case studies and theoretical investigations, lacking relevant verification at the practical level. Based on sorting out relevant literature, we distinguish corporate digital M&A and empirically test the specific impact of digital finance on corporate digital M&A, which is an expansion and supplement to the field of M&A research. Third, we examine two important channels through which digital finance influences corporate digital M&A and examine the relevant differences affecting the efficacy of digital finance in terms of executives, companies, and the environment. The findings provide a valuable reference for optimizing digital finance policies and accelerating the digital transformation of enterprises.

2. Theoretical Background

2.1. Digital Finance and Digital M&A

Financial development has been an important factor influencing the company's M&A activities, and its core logic is that M&A requires large amounts of capital to support it. As an emerging financial infrastructure, digital finance provides good financial and network support for corporate digital M&A. Firstly, digital finance has broadened the sources of credit funding and increased the availability of credit resources. Digital finance has the inclusive nature of low threshold and high coverage [16]. On the one hand, digital finance not only increases the scale of credit in the region, forming a credit supply with a scale effect. It also enhances the willingness of enterprises to apply for credit. On the other hand, digital finance has reconstructed the business operating model and triggered changes in several financial fields, such as lending, payment, and investment. Digital finance has broadened the financing channels of companies, given rise to diverse corporate financing models, and met corporate digital M&A financing needs in many ways by relying on the emerging digital payment platforms and online credit platforms of banks [17]. Secondly, digital finance provides a range of high-quality information processing tools that enhance the ability of companies to handle non-standardized and unstructured information. It helps companies accurately match digital M&A projects with available resources to make the right digital M&A decisions. Thirdly, digital finance extends the service boundaries of traditional finance and alleviates information asymmetry [18]. The resource effect it brings, to a certain extent, alleviates the principal-agent issues and inhibits the risk-averse behavior of managers. With the support of abundant resources, managers will fully mobilize their motivation to capture the opportunities in the transformation and actively engage in digital M&A projects with higher risk levels, but positive expected returns. Fourthly, Teece [19] points out that digital finance has unparalleled and significant advantages in

terms of precise targeting and "one-to-one" services. The credit capacity and credit level profiles of companies generated by digital finance using big data and cloud computing can play an increasingly important role in mitigating enterprise financing risks, improving the relevance and timeliness of financial services, and enhancing the digital financing capability of enterprises. Therefore, we have reasons to believe that corporate digital M&A is more dependent on the support of digital finance. The higher the level of digital finance development, the more opportunities businesses have to access low-cost credit funds, and the more likely they are to participate in digital M&A. Based on this, we propose Hypothesis 1.

Hypothesis 1 (H1). *The higher the level of digital finance development, the more likely firms are to engage in digital M&A.*

2.2. The Mediating Effect of Financing Constraints between Digital Finance and Digital M&A

Financing constraint is the first major channel through which digital finance affects corporate digital M&A. Established research suggests that organizations with abundant cash flow are more likely to make acquisitions than others [20]. Companies with higher financing constraints often set aside more funds for emergencies for precautionary motives [21]. This can lead companies to forgo worthwhile investments and reduce the likelihood of mergers and acquisitions [22]. Compared with other mergers, digital M&A transactions are more complex, time-sensitive, and competitive, and the M&A process requires a large amount of timely capital investment. Therefore, it is difficult for enterprises to solve all the capital needs of the M&A process with their funds, and the ability to obtain sufficient external financing becomes an important indicator of whether the M&A will success or failure. In practice, commercial banks and other traditional financial institutions are more inclined to provide credit lines for state-owned and large enterprises, with insufficient supply to technology-based and transformative companies [23]. The emergence of digital finance has broadened the sources of funds for enterprises, increased the number of corporate financing channels, and made it possible to alleviate the financing constraints of transforming enterprises. On the one hand, digital finance uses its advantages, such as scenarios and services, to absorb a large number of retail investors and small-scale investors existing in the financial market, thereby expanding the supply of funds, lowering the threshold of financial services, and expanding the coverage of long-tail customers [24]. On the other hand, with the new generation of information technology, digital finance can construct a multi-dimensional credit assessment system more accurately and enhance mutual trust and understanding between credit parties, thus reducing the information asymmetry between them and improving the current imbalance of credit resources [25]. In addition, digital finance can streamline the review process and improve the efficiency of financing. Some scholars have found that digital technologies such as big data and cloud computing can increase the speed of credit acceptance by nearly 20% [26]. The simplification of the review process reduces the time for enterprise credit review and improves the efficiency of financial resource allocation. In summary, digital finance has changed the financial service ecosystem and sped up the credit transaction process, enabling more timely and broader coverage of funds to relevant enterprises and increasing the possibility of digital M&A for enterprises [27]. Based on this, this paper proposes Hypothesis 2.

Hypothesis 2 (H2). *Digital finance facilitates corporate digital M&A by easing corporate financing constraints.*

2.3. The Mediating Effect of Innovation Capabilities between Digital Finance and Digital M&A

The innovation capacity is the second important channel through which digital finance influences corporate digital M&A. Digital M&A is not simply a one-time technology acquisition, but a series of small and medium-sized acquisitions based on their own growth strategies and customer service needs. It inevitably creates redundant organizational struc-

tures, which can put pressure on internal integration. Foley and Manova [28] argue that higher innovation capabilities can coordinate internal organizational relationships, reduce conflicts in the integration process, and accelerate the M&A integration process of firms. However, enterprise innovation input and output are considered as a slow, long-term process that requires a large amount of capital investment. Digital finance provides stable and efficient financial support for corporate innovation and facilitates the development of corporate innovation from the financial level. First, digital finance can providing stable and high-quality financial support for corporate innovation and promoting the increase of innovation output [29]. Secondly, digital finance restrains the financial speculation of enterprises, reduces the "crowding out effect" of financial investment on enterprise innovation investment, and creates a good internal environment for enterprise innovation [30]. Thirdly, the development of digital finance can help improve the information asymmetry of financial services and reduce the negative impact of negative information on corporate innovation. The improving innovation capability can sway corporate M&A investment choices and enhance corporate digital M&A willingness. Only companies with a certain level of innovation accumulation and digestion capacity can seek M&A targets that meet their development needs in the M&A market, and the stronger the innovation level of companies, the more external technologies and resources they can absorb and integrate to build relevant digital capabilities [31]. In addition, a higher level of innovation can also reduce the sunk costs in the M&A process, enrich the selection of digital M&A targets, and accelerate the implementation of digital M&A decisions for enterprises. Based on this, this paper proposes Hypothesis 3.

Hypothesis 3 (H3). *Digital finance facilitates corporate digital M&A by improving corporate innovation.*

2.4. The Moderating Effect of Management Age

Age is a direct expression of executives' professional experience, social experience, and maturity, concentrating on their cognitive attitude toward corporate decisions. From the perspective of psychology, human physical strength and energy diminish with age. Younger executive teams tend to be energetic and risk-taking, daring to take the risk of decision-making. A study of executive directors of 354 of the largest companies in the UK found that younger directors are more receptive to new ideas, provide innovative policy advice, are more likely to observe changes in the internal and external environment in which the company operates, and try some innovative behaviors [32]. Older executives, in contrast, are more rigid and conservative in their thinking, slower in reaction time, unwilling to take risks, and have a certain degree of resistance to risk-taking. They prefer to maintain the stable development of the company and are unwilling to change it. This makes it difficult for the inherent corporate strategy and organizational structure to adapt to the rapidly changing and developing market, which is hindering the transformation of the company [33]. Generally speaking, young executives prefer risky decisions [34]. Young executives, with longer careers, are eager to demonstrate their value in the current decision-making process and to increase their social capital so that they can enjoy these higher personal benefits longer into the future. This further increases the risk appetite of young executives in their investment decisions. At the same time, owing to factors such as education and technology, younger executives are less resistant to new things, more creative in their thinking, and more likely to identify problems in the process of corporate development and capture opportunities for transformation and change. Conversely, older executives tend to think in stereotypes and prefer risk avoidance in decision-making [35]. Wiersema and Bantel KA [36] argue that the older the average age of the team, the more risk averse it tends to be, and the fewer strategic decisions it tends to implement. Yim [37] and Zhang et al. [38] found that younger executives have a stronger propensity for M&A. Therefore, we believe that in today's rapidly changing external environment and increasingly competitive market, young executives are open-minded, active, and motivated to put their ideas into

practice [39]. As a result, they are more willing to try to change their competitive strategies and promote digital M&A. Based on this, this paper proposes Hypothesis 4.

Hypothesis 4 (H4). *Management age plays a negative moderating role between digital finance and digital M&A.*

2.5. The Moderating Effect of Internal Control

Internal control is an accounting system including adjustment, restraint, communication, and evaluation designed and implemented internally by a company to achieve its development goals. Scholars have well-researched the advantages surrounding internal control. According to Simons [40], effective internal control has the effect of "encouraging innovative ideas". Cheng et al. [41] argue that the effectiveness of internal control is an important factor in determining the efficiency of corporate investment. However, internal control is, after all, based on systemic constraints and is embodied in a number of specific policies and procedural norms that permeate all levels of the firm. This inevitably leads to a conflict between the normative nature of internal control and the flexibility required for innovative activities [42]. Enterprise transformation is often a trial-and-error process fraught with uncertainty. Overemphasis on control can lead the organization to rigid conformity and a reluctance to take on risky innovative work, ultimately undermining the further development of the business. Jensen [43], in his analysis of the decline of large U.S. companies such as GE, IBM, and AT&T in 1980–1990, pointed out that rigid internal controls constrained the ability of these companies to respond to changing market demands. Kaplan and Norton [44] proposed the "internal control paradox" hypothesis, which argues that a rigid internal control system will lead to a loss of flexibility and a rigid and unwieldy organizational structure, negatively impacting corporate activities. Cohen et al. [45] also suggest that internal controls may create excessive risk-averse behavior among managers and reduce executives' willingness to take risks in innovative corporate activities, thus missing opportunities for corporate growth. Therefore, this paper argues that digital M&A, as a high-risk and high-reward corporate investment behavior, has a natural negative relationship with corporate internal control. The core of internal control emphasizes the control of risk and has solid risk-averse characteristics. Strict internal control largely discourages firms' willingness to engage in digital M&A, thereby reducing digital M&A behavior. Based on this, this paper proposes Hypothesis 5.

Hypothesis 5 (H5). *Internal control plays a negative moderating role between digital finance and digital M&A.*

2.6. The Moderating Effect of Bank Competition

Competition is an effective way to achieve resource allocation, and banks are the primary implementers of digital finance. The change in bank competition directly affects the effect of digital finance [46]. According to Porter's competitive strategy theory [47], the core goal and the most direct way of enterprise competition is to compete for customers. In a competitive banking structure, with the intensification of competition in the banking industry, the rent value of banks is continuously decreasing, and the performance pressure on banks will become greater and greater. At this time, to avoid damage to their interests, banks will have a strong incentive to collect and explore corporate information, thus reducing the degree of information asymmetry between banks and enterprises and alleviating the financing constraints faced by enterprises. The enhanced degree of bank competition has also broken up monopolies to a certain extent, promoting the deepening of financial services and increasing bank financial support to enterprises [48]. In particular, it can have a more significant alleviating effect on the financing constraints of firms with higher investment risks and relatively higher financing dependence. Fierce market competition has prompted banks to provide loans to enterprises at lower interest rates, reducing the financing costs of enterprises [49]. At the same time, it is conducive to further prompting

banks to innovate credit technology and provide more diversified and targeted digital financial services and products for enterprises, thereby increasing the supply of capital in the digital M&A market. Based on this, this paper proposes Hypothesis 6.

Hypothesis 6 (H6). *Bank competition plays a positive moderating role between digital finance and digital M&A.*

3. Study Design

3.1. Sample Selection and Data Collection

This paper takes the M&A data of Shanghai and Shenzhen A-share listed companies from 2011 to 2020 as the research sample and makes the following processing: (1) only retain the sample whose trading status code is the buyer; (2) eliminate the samples whose restructuring type codes are asset divestiture, debt restructuring and share repurchase; (3) eliminate the sample whose target classification code is the asset; and (4) eliminate the sample of connected transactions. The original data is from the CSMAR database, and the business scope of the enterprise comes from the CSMAR database and the Internet.

3.2. Variable Definition

3.2.1. Explained Variable

Digital M&A: Drawing on articles related to digital transformation, we determine whether the transaction belongs to digital M&A or not by examining the business scope of the acquired company. The specific ways are as follows. We perform a textual analysis of the business scope, if the business scope of the purchased company contains keywords such as digitalization, informatization, networking, intelligence, cloud computing, cloud services, cloud storage, Internet, Internet of Things, e-commerce, etc., the M&A transaction is defined as a digital M&A and is assigned a value of 1. Otherwise, it is a non-numeric merger, assigned a value of 0.

3.2.2. Explanatory Variable

Digital finance: Referring to the existing studies, this paper selects the Digital Inclusive Finance Index compiled by Peking University as the measurement index of digital finance. The index vividly portrays the current geographical differences among provinces, prefectures, and counties in China in the process of digital finance development, and has become an important tool for current research on finance-related issues in China. This paper uses the digital financial index at the city level.

3.2.3. Mediating Variables

Financing constraints: Using the SA index to measure the level of financing constraints of enterprises [50], this indicator is negative, with larger numbers indicating more severe financing constraints.

Innovation capability: Using the number of patents plus one, then taking the logarithm for measurement.

3.2.4. Moderating Variables

Management age: Using the average age of executive members for measurement.

Internal control: Using the DIB Internal Control Index to measure the level of internal control of companies.

Bank competition: Using the share of the number of branches of different types of banks in each province, the Herfindahl index (HHI) of the banking industry is calculated to measure the degree of bank competition in each province and city. The corresponding calculation formula is as follows:

$$HHI_{j,t} = \sum_{k=1}^{K_{j,t}} \left(branch_{k,j,t} / \sum_{k=1}^{K_{j,t}} branch_{k,j,t} \right)^2 \tag{1}$$

In Equation (1), $HHI_{j,t}$ denotes the Herfindahl index value of province j in period t. $K_{j,t}$ denotes the number of all types of banks in province j in period t. $branch_{k,j,t}$ denotes the number of category k banks in province j in period t. The median HHI index value provides a reference for measuring the degree of bank competition in each province. When the HHI value is lower than the median, the bank is more competitive and assigned a value of 1. On the contrary, it is assigned a value of 0.

3.2.5. Control Variables

The control variables include enterprise size, operating income growth rate, operating cash flow, book-to-market ratio, shareholding ratio of the largest shareholder, proportion of independent directors, return on total assets, and return on net assets. City-level GDP and GDP growth rates are also controlled.

To reduce the impact of sample extremes on the regressions, using the Winsorize method to reduce the number of tails for 1% and 99% of the continuous variables. The specific variables are defined as shown in Table 1.

Table 1. Variable definition.

Variable	Symbol	Notes
Digital M&A	M&A	
Digital finance	INDEX	
Financing constraints	SA	
Innovation capability	PATENT	Definition as above
Management age	AGE	
Internal control	IC	
Bank competition	BC	
Enterprise size	SIZE	Natural logarithm of total assets
Operating income growth rate	GROWTH	Operating income of the current year/ Operating income of the previous year-1
Operating cash flow	CASH	EBITDA + depreciation and amortization − working capital additions − capital expenditures, then take the natural logarithm
Book-to-market ratio	BM	Ownership interest/Market value
Shareholding ratio of the largest shareholder	TOP1	Number of shares held by the largest shareholder/ Number of shares outstanding
Proportion of independent directors	IND	Number of independent directors/ Total number of board seats
Return on total assets	ROA	Net profit/Total assets
Return on net assets	ROE	Net income/Owner's equity
GDP	GDP	Natural logarithm of total City-level GDP
GDP growth rates	GDPG	City-level GDP growth rate

3.3. Model Setting

Based on the hypothesis proposed in the previous section, we construct the multiple regression model to explore the specific impact of digital finance on corporate digital M&A. This paper uses Logit regression.

$$M\&A_{i,c,t} = \alpha_0 + \alpha_1 INDEX_{c,t} + \alpha_2 X + \sum year + \sum industry + \varepsilon_{i,t} \qquad (2)$$

In Equation (2), $M\&A_{i,c,t}$ indicates the possibility of digital M&A of i company located c in t year. X is a set of control variables. $index_{c,t}$ indicates the level of digital financial development of c city in t year. This paper focuses on its coefficient α_1, whose magnitude and direction reflect the orientation and intensity of digital finance on digital M&A of Chinese companies. According to our hypothesis, this coefficient should be positive. With the continuous improvement of the level of digital finance, the digital M&A of enterprises is gradually rising. $\varepsilon_{i,t}$ denotes the random error term. In addition, the year fixed effect and industry fixed effect are added to construct a two-way fixed effects model.

Further, in order to reveal the specific path of digital finance influencing corporate digital M&A, the following mediation test model is constructed.

$$medium_{c,t} = \beta_0 + \beta_1 INDEX_{c,t} + \beta_2 X + \sum year + \sum industry + \varepsilon_{i,t} \tag{3}$$

$$M\&A_{i,c,t} = \gamma_0 + \gamma_1 INDEX_{c,t} + \gamma_2 medium_{c,t} + \gamma_3 X + \sum year + \sum industry + \varepsilon_{i,t} \tag{4}$$

In Equations (3) and (4), $medium_{c,t}$ are the mediator variables, including the SA and PATENT, and the other variables are the same as in Equation (2).

4. Empirical Analysis

4.1. Descriptive Statistics

Prior to the regression analysis, we first performed descriptive statistics on the variables. The results are shown in Table 2. The mean value of M&A is 0.179, indicating that about 17.9% of firms have engaged in digital M&A, less than one in five. This shows that digital M&A is currently still a spontaneous act of a small group of companies. The mean, minimum and maximum values of INDEX are 5.322, 4.083 and 5.771, indicating that the development of digital finance is uneven across provinces. As for the mediating variables, the mean, minimum and maximum values of SA are −3.847, −4.580 and −3.354, indicating that some companies face greater financing constraints. The mean, minimum and maximum values of PATENT are 1.659, 0 and 5.357, indicating a large difference in innovation capability between companies. As for the moderating variables, the mean, minimum and maximum values of AGE are 50.611, 42.222 and 59.222, indicating the average Chinese corporate executive is in mid-life. The mean, minimum and maximum values of IC are 6.322, 3.714 and 6.675, indicating the overall internal controls of Chinese companies are relatively similar. The mean, minimum and maximum values of BC are 0.556, 0 and 1, indicating that China's banking industry is more competitive.

Table 2. Descriptive statistics.

Variable	N	Mean	Std	Min	Mid	Max
M&A	3816	0.179	0.383	0	0	1
INDEX	3816	5.322	0.367	4.083	5.405	5.771
SA	3816	−3.847	0.239	−4.580	−3.829	−3.354
PATENT	3816	1.659	1.459	0	1.609	5.357
AGE	3816	50.611	3.540	42.222	50.571	59.222
IC	3816	6.322	1.016	3.714	6.504	6.675
BC	3816	0.556	0.497	0	1	1
SIZE	3816	22.026	1.113	19.967	21.881	25.664
GROWTH	3816	0.228	0.413	−0.476	0.155	2.609
CASH	3816	10.520	15.676	−21.185	18.462	22.567
BM	3816	0.323	0.160	0	0.305	0.754
TOP1	3816	32.961	14.226	8.770	30.615	70.75
IND	3816	37.590	5.248	33.33	35.71	57.14
ROA	3816	0.043	0.0491	−0.1773	0.042	0.178
ROE	3816	0.071	0.091	−0.423	0.074	0.282
GDP	3816	11.564	0.437	10.176	11.642	12.579
GDPG	3816	7.984	2.580	1.200	7.870	16.200

Figure 1 shows the comprehensive overview of digital M&A in China by year. The first stage is the "rapid development" from 2011 to 2015. At this stage, the government relaxed the restrictions on the capital market, and the loose regulatory environment caused the continuous boom of the M&A market. The introduction of the "Internet+" policy has attracted many enterprises to seek to acquire companies that have digital technology, which has brought about the development of digital M&A transactions. The second stage is "steady development" from 2016 to 2018. Regulation and innovation have become the keywords in this phase. In early 2016, A-share meltdowns occurred several times.

Since then, financial and M&A regulation have become more tightened. The principle of "one matter at a time" was adopted for cross-industry M&A. With multiple measures, the M&A market tended to calm down. Meanwhile, after the G20 Hangzhou Summit raised the topic of "digital economy", digital M&A with the aim of innovative development and strategic coordination has received continuous attention. Furthermore, the third stage is "new development" after 2019. The government has further increased the regulation of finance (especially digital finance) due to the P2P incident. The outbreak of COVID-19 has had a serious impact on the M&A market. In the COVID-19 governance practices, companies with a higher degree of digital transformation show greater advantages, thus attracting more companies to achieve digital transformation by digital M&A.
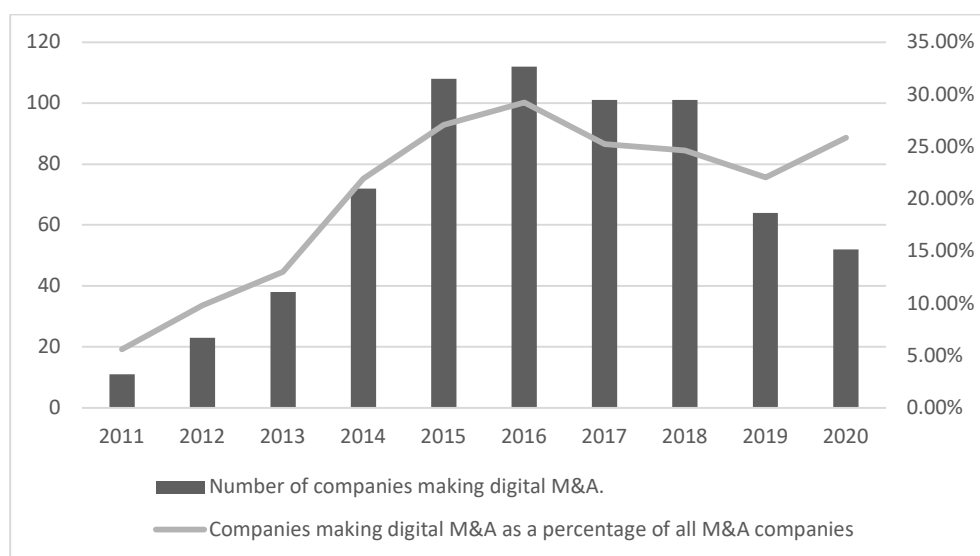
Figure 1. Total amount and trend of digital M&A. Data source: compiled by the author.

4.2. Correlation Coefficient Matrix

We plotted the correlation coefficient matrix of the variables, as shown in Table 3. As the example of the Pearson correlation coefficient, the correlation coefficient between INDEX and M&A is 0.136, which is significantly positive at the 1% level, keeping in line with Hypothesis H1. Most of the correlation coefficients between variables are below 0.5, indicating no serious multicollinearity between variables.

Table 3. Correlation coefficient matrix.

	M&A	Index	SA	Patent	Age	IC	BC
M&A	1	0.120 ***	−0.046 ***	0.016	−0.058 ***	−0.011	0.021
index	0.136 ***	1	−0.075 ***	0.079 ***	0.130 ***	−0.139 ***	0.291 ***
SA	−0.044 ***	−0.140 ***	1	−0.090 ***	−0.042 **	−0.122 ***	−0.034 **
patent	0.014	0.083 ***	−0.085 ***	1	0.063 ***	0.063 ***	0.151 ***
Age	−0.065 ***	0.131 ***	−0.032 **	0.065 ***	1	0.029 *	−0.014
IC	−0.007	−0.034 **	−0.153 ***	0.088 ***	0.059 ***	1	−0.006
BC	0.021	0.293 ***	−0.026	0.154 ***	−0.013	0.023	1

Due to space constraints, only the correlation coefficients of some variables are reported. The Pearson correlation coefficient is shown in the lower left corner, and the Spearman correlation coefficient is shown in the upper right corner. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

4.3. Regression Analysis

Table 4 portrays the relationship between the level of digital finance development in cities and the digital M&A decisions of companies. From the results in columns (1) of Table 4, the coefficient of INDEX is 1.925 and passes the 5% significance level test. It indicates that regional digital finance development is an important indicator influencing

corporate digital M&A. The higher the level of development, the more obvious the support for corporate digital M&A. Hypothesis H1 is verified. Meanwhile, the value of Pseudo R^2 is 0.125, indicating the fitting degree of model is good.

Table 4. Regression analysis.

	M&A	M&A	M&A	M&A
	(1)	**(2)**	**(3)**	**(4)**
INDEX	1.925 **			
	(2.38)			
BREADTH		1.301 **		
		(2.19)		
DEPTH			0.962 *	
			(1.83)	
LEVEL				0.147
				(0.24)
SIZE	−0.109 **	−0.112 **	−0.109 **	−0.113 **
	(−2.25)	(−2.31)	(−2.24)	(−2.34)
GROWTH	0.173	0.169	0.173	0.168
	(1.56)	(1.53)	(1.57)	(1.52)
CASH	−0.006 *	−0.006 *	−0.006 *	−0.006 *
	(−1.84)	(−1.82)	(−1.86)	(−1.83)
BM	−0.671 **	−0.671 **	−0.662 *	−0.670 **
	(−1.97)	(−1.97)	(−1.95)	(−1.98)
TOP1	−0.005	−0.005	−0.005	−0.004
	(−1.32)	(−1.32)	(−1.32)	(−1.31)
IND	0.012	0.011	0.013	0.013
	(1.37)	(1.35)	(1.49)	(1.54)
ROA	3.515	3.546	3.639	3.822
	(1.50)	(1.51)	(1.55)	(1.64)
ROE	−2.466 **	−2.449 **	−2.543 **	−2.545 **
	(−1.97)	(−1.96)	(−2.03)	(−2.04)
GDP	0.074	0.094	0.260 *	0.401 ***
	(0.39)	(0.49)	(1.70)	(3.06)
GDPG	0.035	0.031	0.031	0.020
	(1.20)	(1.07)	(1.07)	(0.73)
Constant	−12.468 ***	−10.060 ***	−10.394 ***	−8.215 ***
	(−4.21)	(−4.16)	(−3.97)	(−2.65)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
N	3816	3816	3816	3816
Pseudo R^2	0.125	0.125	0.124	0.123

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Further, in order to more accurately reflect the impact effect of digital finance on corporate digital M&A, the sub-indicators of digital inclusive finance were selected for re-regression. Column (2), column (3) and column (4) are the regression results of three indicators: breadth of coverage, depth of use, and digitization level, respectively. When the coverage breadth is used as the explained variable, the coefficient is 1.301 and passes the 5% significance level test. When the usage depth is used as the explained variable, the coefficient is 0.962 and passes the 10% significance level test. However, when the digitization level is used as the explained variable, although the regression coefficient is positive, it has no statistical significance. The above regression results show that the breadth and depth of digital finance play a more prominent role than the level of digitization. The core landing point of digital finance is still reflected in financial services, which makes a relevant reference for the subsequent further implementation of the development direction of digital finance.

4.4. Mediating Effect Test

Table 5 shows the results of the test for mediating effects. Columns (1) and (2) explore whether digital finance can influence corporate digital M&A by affecting financing constraints. It can be seen that digital finance significantly inhibits corporate financing constraints. Additionally, there is a significant negative relationship between financing constraints and corporate digital M&A. That is, the lower the financing constraints faced by enterprises, the more likely enterprises are to conduct digital M&A. The positive path of "digital finance—financing constraints—digital M&A" is formed, and the partial mediating role of financing constraints between digital finance and digital M&A is verified. In fact, the constraints of financing costs make managers more cautious in their choice of investment in M&A, thus reducing the likelihood of digital M&A. In contrast, an adequate supply of capital will stimulate managers' willingness to make risky investments, prompting them to have the confidence and ability to undertake digital M&A. Similarly, columns (3) and (4) are tests for the mediating effect of innovation capability. As seen from the table, digital finance significantly promotes enterprise innovation, and the improvement of enterprise innovation has a positive effect on digital M&A. The positive path of "digital finance—innovation capability—digital M&A" is formed, and the partial mediating role of innovation capability between digital finance and digital M&A is verified. Overall, higher innovation capacity facilitates companies to choose diversified digital transformation models and provides technical guarantees for companies to overcome difficulties in digital M&A.

Table 5. Mediating effect test.

	SA	M&A	PATENT	M&A
	(1)	(2)	(3)	(4)
INDEX	−0.793 ***	1.843 **	1.478 ***	1.830 **
	(−2.64)	(2.22)	(4.98)	(2.25)
SA		−0.064 **		
		(−1.99)		
PATENT				0.065 *
				(1.77)
Control	YES	YES	YES	YES
constant	3.302 ***	−12.612 ***	−12.135 ***	−11.660 ***
	(3.38)	(−4.16)	(−11.65)	(−3.89)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
N	3816	3816	3816	3816
Pseudo R^2	0.241	0.127	0.290	0.125

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

4.5. Moderating Effect Test

Table 6 shows the regression results of the moderating effects. Column (1) explores the moderating effect of management age. It can be seen that the regression coefficient of INDEX × AGE is −0.083, which is significantly negative at the 10% level. This indicates that the younger the management team is, the more likely it is to engage in digital M&A. The Hypothesis H4 is verified. Column (2) explores the moderating effect of internal control. It can be found that the regression coefficient of INDEX × IC is −0.593, which is significantly positive at the 5% level, indicating that internal control plays a negative moderating role between digital finance and digital M&A, which verifies Hypothesis H5. Column (3) explores the moderating effect of bank competition, which can be found that the regression coefficient of INDEX × BC is 1.004, which is significantly positive at the 1% level, indicating that bank competition plays a positive moderating role. Hypothesis H6 is verified.

Table 6. Moderating effect test.

	M&A	M&A	M&A
	(1)	**(2)**	**(3)**
INDEX	6.162 **	5.630 ***	2.286 ***
	(2.37)	(3.07)	(2.76)
INDEX×AGE	−0.083 *		
	(−1.73)		
AGE	0.425		
	(1.63)		
INDEX×IC		−0.593 **	
		(−2.25)	
IC		3.271 **	
		(2.25)	
INDEX×BC			1.004 ***
			(2.94)
BC			−5.408 ***
			(−2.93)
Control	YES	YES	YES
Constant	−34.132 **	−33.045 ***	−14.859 ***
	(−2.52)	(−3.42)	(−4.74)
Year	YES	YES	YES
Industry	YES	YES	YES
N	3816	3816	3816
Pseudo R^2	0.127	0.125	0.127

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

4.6. Robustness Test

This section tests the robustness of the relevant assumptions to improve the persuasiveness of the core findings. Table 7 shows the regression results of all tests. Firstly, considering the geographical development differences in digital finance caused by different levels of regional economic development and Internet development, we adopt the method of introducing province dummy variables to control for the development differences existing between different provinces and regions, and the regression results are shown in column (1). Secondly, we replace the explanatory variable as the number of digital M&A for regression analysis, as shown in column (2). Thirdly, the manufacturing industry is the main body of national economy and also the main position of digital transformation. Therefore, the regression analysis is performed on the manufacturing samples, and the results are shown in column (3). The above regression results verify the robustness of the study findings.

Table 7. Robustness test.

	Adding Province Dummy Variables	Number of Digital M&A	Manufacturing Enterprises	Lag 1 Period	PSM
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
INDEX	2.381 **	1.428 **	3.164 ***	2.112 ***	2.702 **
	(2.11)	(2.57)	(3.23)	(2.74)	(2.43)
Control	YES	YES	YES	YES	YES
Constant	−13.834 ***	−8.447 ***	−12.058 ***	−11.531 ***	−12.957 ***
	(−3.50)	(−4.25)	(−3.59)	(−4.09)	(−3.25)
Year	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES
Province	YES	NO	NO	NO	NO
N	3816	3816	2467	3609	1143
Pseudo R^2/R^2	0.136	0.094	0.050	0.121	0.129

*** $p < 0.01$; ** $p < 0.05$.

The potential endogeneity of this paper includes the two-way causality between digital finance and digital M&A, and the possible problem of sample selection bias. In response to the first endogeneity, we argue that the effect of micro data on macro variables is

weaker. We also test the results of tests that lagged the explanatory variables by one period, as shown in column (4). The results show that the relevant findings remain robust after controlling for this endogeneity. Finally, we use propensity score matching (PSM) to address the second type of endogeneity. Specifically, 1:1 no-release nearest neighbor matching is performed with SIZE, GROWTH, SA, PATENT, ROA, and ROE as the feature variables, and 1143 samples are obtained after matching. The regression results of column (5) show that, after controlling for the related endogeneity, *index* is still significantly positive at the level of 5%, further proving the robustness of the conclusion.

5. Conclusions

Digital transformation has become an important means for enterprises to achieve sustainable development. Whoever can be the first to complete digital transformation will be able to occupy an advantageous position in the era of digital economy. In this paper, we choose digital M&A as a specific path of digital transformation to study. The study found that digital finance has a positive effect on corporate digital M&A. This conclusion still holds after a series of robustness tests. In terms of action mechanisms, the development of digital finance provides a large amount of new capital supply for enterprises, which helps to alleviate their financing constraints and improve their innovation capabilities, thus facilitating the implementation of digital M&A. We also examine the moderating effects from three perspectives: executive, firm, and industry. The study found that young executive teams, lax internal controls, and fierce bank competition reinforce the positive effect of digital finance on digital M&A.

Based on the findings of the study, the paper has the following suggestions. First, we found that digital finance has a significant facilitating effect, concentrating on the breadth of coverage and depth of application. Additionally, the impact of digitization is not obvious. Therefore, the government should be targeted to support and promote the digital finance development, giving full play to the advantages of digital finance and improving the efficiency of digital financial services. Second, financing constraints are a major obstacle to business development. The government should deepen the financial supply-side reform and establish a multi-level financial service system. It can effectively solve the problem of "difficult and high cost of financing" faced by enterprises. Third, enterprises should increase investment in research and development to improve their own innovation level. Only in this way can they occupy an advantageous position in the increasingly fierce market competition. Fourth, the company should strengthen the overall construction of the executive team and maintain a reasonable age structure. It is necessary to give full play to the advantages of older managers who are mature and stable, but also to mobilize the enthusiasm of young and middle-aged managers. Fifth, the conclusion of this paper is not that companies do not need internal control, but that companies should avoid rigid internal control. Through extensive communication and practice, companies should seek a reasonable state of internal control between risk and benefit. Sixth, the government should, on the one hand, encourage banks to establish healthy competition with each other, on the other hand, promote traditional financial institutions to actively explore digital transformation, deepen the use of digital technology. Finally, governments at all levels should be aware of the role and importance of digital M&A in the digital transformation of the entire economy and society. They should strengthen their guidance and support for digital M&A and actively create a favorable business environment for digital M&A. Meanwhile, enterprises should establish the right digital M&A strategy that fits their growth needs. Under the guidance of the transformation strategy, companies should consciously search for M&A targets and increase their digital M&A efforts, so as to accelerate the formation of their own digital capabilities and achieve digital transformation.

This paper also has some limitations. Firstly, existing studies fail to make a clear definition of whether corporate M&A is digital M&A. We use the method of textual analysis to define it in one way, while other methods require continued research by subsequent scholars; secondly, there are many factors that influence corporate digital M&A, such as the

intrinsic driving role of executive background characteristics and the extrinsic guiding role of economic policies, which need to be further examined by scholars. Finally, this paper only focuses on digital M&A as a specific measure to realize the digital transformation of enterprises, and in the future, we can focus on the realization paths such as self-built digital capabilities and digital platform construction to help digital transformation.

Author Contributions: Conceptualization, M.Y.; methodology, A.Y. and M.Y.; data collection, integration and analysis, A.Y.; writing—original draft preparation, A.Y.; writing—review and editing, A.Y. and M.Y.; funding acquisition, M.Y. All authors have read and agreed to the published version of the manuscript.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The dataset is available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

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