

The Impact of Digital Transformation on Financing Constraints of Overseas Subsidiaries: Evidence from Chinese Multinational Enterprises

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Abstract

Digital transformation occupies a central place in the strategies of multinational enterprises (MNEs). How it shapes the financing constraints of their overseas subsidiaries, however, has attracted little empirical attention. This paper draws on panel data covering Chinese listed multinational enterprises and their overseas subsidiaries over the period 2010 to 2024, and asks whether digital transformation at the parent company eases the financing constraints of subsidiaries abroad. The parent company's level of digital transformation is captured by the frequency of digital-related keywords in its annual reports; financing constraints are proxied by the SA index. Estimation relies on high-dimensional fixed-effects models. Parent company digital transformation is found to ease the financing constraints faced by overseas subsidiaries. This conclusion survives alternative specifications, the exclusion of the COVID-19 period, and instrumental variable estimation designed to address endogeneity. In terms of heterogeneity, the effect is stronger for subsidiaries located in developing countries, for those in non-digital industries, and for those whose parent firms are not state-owned. By shifting attention to subsidiary-level financial outcomes inside multinational enterprises, the paper adds to existing work on digital transformation. The evidence assembled here also indicates that digitalization changes how resources are allocated across borders and how subsidiaries are financed, which carries practical weight for Chinese firms expanding internationally.

Keywords

Digital Transformation; Financing Constraints; Overseas Subsidiaries; Multinational Enterprises.

1. Introduction

The competitive environment in which multinational enterprises (MNEs) operate has been reshaped by the rapid growth of the digital economy. Data now counts as a factor of production in its own right, and technologies ranging from cloud computing and big data to artificial intelligence and digital platforms have come to drive organizational change and value creation [1-3]. Few firms still treat digital transformation as a matter of technological upgrading alone. It is better described as a strategic process in which business models are redesigned, resource allocation is reworked, and organizational capabilities are rebuilt. With global economic uncertainty persisting and digitalization advancing, parent companies increasingly look to digital transformation to raise the efficiency of cross-border operations and to hold on to competitive advantage.

China ranks among the world's fastest-growing digital economies. The scale of that economy has kept expanding since the national digital development strategy was introduced, and industrial digitalization together with digital industrialization now serves as a major engine of

growth [4]. Relative to earlier technological revolutions, the country has built up advantages in digital infrastructure, data resources and digital technology applications, which makes it easier for enterprises to press ahead with digital transformation. On the other side of the ledger, rising domestic labor costs and a fading demographic dividend have pushed Chinese firms toward outward foreign direct investment as a route to new markets and strategic resources. In this setting, the operational capability and financial resilience of overseas subsidiaries matter more than ever for the international expansion of Chinese multinational enterprises.

Among the difficulties that overseas subsidiaries run into abroad, financing constraints stand out. Relative to domestic affiliates, they confront sharper information asymmetry, costlier credit and more formidable institutional barriers in host countries, all of which complicate access to outside finance [5-6]. Internal capital markets offer multinational enterprises a way to move resources around the group, yet how well cross-border capital allocation works depends on the parent company's organizational capabilities and its capacity to handle information [7]. Digital transformation can raise the transparency of internal information, curb agency and transaction costs, and make it easier to allocate capital among subsidiaries spread across different locations.

The economic consequences of digital transformation are by now well documented. Prior work links it to innovation, operating efficiency, productivity and firm value, all of which are traced back to organizational restructuring and capability upgrading [8]. Its effects on corporate governance, financing efficiency and capital market performance have also been examined [9-10]. What this body of research concentrates on, however, is the parent company's own outcomes. Spillovers from parent company digital transformation to overseas subsidiaries within multinational networks have received far less attention, and studies of financing constraints have looked mainly at domestic firms rather than at subsidiaries operating under heterogeneous institutions. As a result, the cross-border channel through which digital transformation reaches subsidiary financing conditions is still poorly understood.

This study draws on the resource-based view to argue that digital transformation at the parent company amounts to a strategic organizational capability, one that can travel across a multinational network through digital coordination, information sharing and resource integration [11]. Where the parent company becomes better at mobilizing and allocating strategic resources across borders, financing frictions should ease and subsidiaries should find it easier to obtain funds. Studying the link between parent company digital transformation and overseas subsidiary financing constraints therefore opens a fresh angle on how digital transformation creates value internationally.

Panel data on Chinese listed multinational enterprises and their overseas subsidiaries, covering 2010 to 2024, provide the basis for the empirical work. Digital transformation at the parent company is measured by how often digital-related keywords appear in annual reports; the SA index serves as the measure of financing constraints. High-dimensional fixed-effects models absorb heterogeneity at the parent company, subsidiary, host-country and year levels. A leave-one-out regional-industry digitalization measure is used as an instrumental variable for endogeneity, and a set of robustness tests accompanies the main estimates.

Three contributions follow from this analysis. In extending the digital transformation literature beyond parent-company outcomes to financing outcomes at the subsidiary level, the paper supplies evidence on cross-border spillovers within multinational enterprises. The resource-based view also gains from the account offered here of how digital transformation strengthens a parent company's ability to place strategic resources across borders and thereby relieve subsidiaries' financing constraints. Finally, by taking Chinese listed multinational enterprises as its setting, the study adds evidence from a major emerging economy and speaks to the practical questions of how digital transformation is promoted, how overseas resources are allocated, and how international competitiveness is built.

The paper proceeds in the following order. Section 2 develops the theoretical model and the research hypothesis. Section 3 sets out the data, variables and estimation strategy. Section 4 reports the baseline results together with the robustness and endogeneity tests. Section 5 draws conclusions and discusses policy implications.

2. Theoretical Model and Hypothesis

2.1. Theoretical Model

2.1.1. Resource-Based View and Parent Company Digital Transformation

According to the resource-based view (RBV), sustainable competitive advantage rests on resources and capabilities that are valuable, rare, hard to imitate and difficult to substitute [12]. In multinational enterprises (MNEs), advantage does not come from tangible assets alone. It also flows from the organizational capabilities that allow a firm to integrate, coordinate and deploy resources across subsidiaries that are geographically dispersed [13]. Digital transformation, understood as a strategic capability, sharpens a firm's ability to acquire, process and put information resources to use, which in turn improves coordination and speeds up decisions.

Parent companies that pursue digital transformation build infrastructures through which information and resources circulate within the multinational network. Cloud computing, big data analytics, artificial intelligence and digital platforms give headquarters a clearer view of how subsidiaries operate, allow resource use to be tracked as it happens, and make cross-border allocation more accurate. Set against traditional organizational systems, these technologies cut information asymmetry and coordination costs, and they improve the working of internal capital markets. Digital transformation thus takes on the character of a strategic resource, one that moves from the parent company to overseas subsidiaries by way of organizational routines and digital governance.

A resource-based reading also implies that strategic resources yield value only when they are put to work across the organization instead of sitting at headquarters. Digital capabilities accumulated at the parent company therefore spill over into the wider multinational group. Better communication, closer internal collaboration and freer knowledge sharing leave the parent company in a stronger position to support subsidiaries operating under different institutional conditions. Access to financial and informational resources improves as a result, which is the theoretical ground on which the argument about cross-border financing constraints rests.

2.1.2. Financing Constraints Theory and Overseas Subsidiaries

Financing constraints theory holds that information asymmetry, agency conflicts and imperfections in capital markets can leave a firm unable to raise the external funds its investment projects require [14]. Outside investors know less about a firm than its managers do, so constrained firms are charged more for credit or rationed outright even when they hold profitable opportunities. Investment decisions, operating efficiency and long-run growth are all affected in consequence.

Overseas subsidiaries are more exposed to financing constraints than domestic firms, since they work inside host countries whose institutions and financial systems differ from those at home. Their credit histories are shorter than the parent company's, the collateral they can pledge is limited, and their ties to local lenders are thin, so external financing is harder to arrange [15]. Variation across host countries in legal systems, financial market development and disclosure requirements adds to these frictions [16].

Internal capital markets are the main mechanism through which multinational enterprises relieve subsidiary financing constraints. Headquarters can shift financial resources between

subsidiaries in line with investment opportunities and strategic priorities, which lowers the group's reliance on outside capital markets. How well that allocation works, though, hinges on the parent company's ability to gather information, keep track of subsidiary operations and coordinate resources across countries. Where information moves slowly and agency problems are pronounced, internal capital markets do less than expected and subsidiaries may remain financially constrained.

Digital transformation gives parent companies a way to make internal capital markets work better, by raising information transparency and tightening resource coordination inside the multinational network. Financial information can be shared as it arises, subsidiary operations can be monitored more closely, and financial resources can be distributed more sensibly among geographically dispersed units. On this basis, financing constraints theory supplies the analytical foundation for explaining why parent company digital transformation might ease the constraints that overseas subsidiaries face.

2.2. Digital Transformation and Financing Constraints of Overseas Subsidiaries

The way multinational enterprises (MNEs) coordinate resources and manage subsidiaries in different locations has been altered by digital transformation. It amounts to more than the adoption of new technologies; what it reflects is the growth of organizational capabilities that improve information processing, resource integration and cross-border coordination. Seen through the resource-based view, digital capabilities are organizational resources of real value, and they help a parent company deploy strategic assets more efficiently throughout the multinational network. Read together with financing constraints theory, they point to weaker financing frictions for overseas subsidiaries, working through more efficient internal resource allocation and firmer organizational support.

One channel runs through information asymmetry. Because outside investors and headquarters rarely hold complete information about a firm's operating conditions and investment opportunities, financing constraints arise; this is one of their principal causes. For overseas subsidiaries the difficulty is greater still, since information is costly to transmit and monitoring is difficult when institutions differ across countries. Integrated digital systems built by the parent company link financial, operational and supply chain data from subsidiaries in real time. With information that is better in quality and more timely and transparent, headquarters can identify what subsidiaries need to finance and where their investment opportunities lie, which narrows internal information asymmetry and leads to sounder financing decisions.

A second channel operates on the efficiency of internal capital markets. These markets let a parent company redistribute financial resources among subsidiaries in accordance with strategic priorities and investment opportunities, and earlier work finds that efficient internal allocation helps subsidiaries get past constraints that stem from imperfections in external markets. Effectiveness, however, turns on the parent company's capacity to collect information, watch subsidiary performance and coordinate resources across countries. Digital transformation bolsters that capacity: communication becomes quicker, financial monitoring can be done in real time, and the coordination costs of running operations across borders fall [17]. Headquarters can then direct capital with more precision and react faster when a subsidiary runs short of funds, which reduces reliance on expensive external finance.

A third channel concerns the subsidiaries' access to external finance. Digital transformation has been shown to raise operating efficiency and the quality of disclosure and to make organizations more transparent, which strengthens a firm's standing in financial markets and lowers its cost of funds. Where the parent company imposes stronger digital governance, subsidiaries send a signal of competent management and reliable resource backing, and lenders and investors in the host country tend to respond with greater confidence. Risk identification

and financial management also improve, so subsidiaries can put financial resources to better use and carry less financing risk. The upshot is that external financing becomes available on more favorable terms.

Beyond these channels lies the question of adaptability. Digital transformation strengthens the dynamic capability with which a parent company integrates and reconfigures resources as international conditions shift. Overseas subsidiaries commonly work under regulatory systems, levels of financial market development and business risks that differ from one host country to the next. Digital tools make cross-border coordination more flexible and shorten the response time to uncertainty. With cross-border collaboration and organizational responsiveness improved, the parent company can extend steadier financial support and help subsidiaries absorb financing shocks.

Taken together, the resource-based view and financing constraints theory suggest that parent company digital transformation enhances information transparency, improves the allocation efficiency of internal capital markets, strengthens organizational coordination, and ultimately reduces financing constraints for overseas subsidiaries. These capabilities lower financing frictions within the multinational group and widen the access of overseas subsidiaries to financial resources.

Hypothesis 1: Digital transformation at the parent company eases the financing constraints of overseas subsidiaries.

3. Research Design

3.1. Econometric Model Specification

Drawing on the theoretical analysis and the hypothesis set out above, the following baseline econometric model is specified:

$$SA_{it}^A = \beta_0 + \beta_1 Digital_{jt}^P + \beta_2 Digital_{jt}^{2P} + \omega X + \alpha_i + \gamma_t + \varepsilon_{ijt} \quad (1)$$

Where the dependent variable is SA_{it}^A which is the financing constraints of foreign affiliate i at year t . $Digital_{jt}$ indicates the digital transformation level of parent company j in year t . X includes a range of control variables.

At the subsidiary level, lagged subsidiary size (Lagged Subsidiary Asset) is controlled for. Characteristics of the parent company enter through the shareholding ratio of the ten largest shareholders (Top10) and the current ratio (Current Ratio). At the host-country level the controls are inflation (Inflation), GDP per capita (GDP per Capita), market potential (GDP Growth) and technological development (Hightech).

Omitted-variable bias is addressed by absorbing several dimensions of unobservable heterogeneity. Subsidiary fixed effects take out time-invariant differences between overseas subsidiaries; host-country fixed effects absorb persistent differences across destination countries; and year fixed effects capture macroeconomic shocks common to all observations, together with global business cycle effects. To allow for correlation within a firm over time, standard errors are clustered at both the parent company and the overseas subsidiary level.

3.2. Variable Definition

3.2.1. Dependent Variable

Financing constraints are commonly treated as a gauge of a firm's financial condition and of how readily it can raise external funds. Earlier studies trace them to information asymmetry, agency conflicts and imperfections in capital markets, all of which restrict what a firm can invest and how far it can grow. Overseas subsidiaries face unfamiliar institutions, short credit

histories and higher borrowing costs in host countries, so they are likelier than domestic firms to be constrained. Measuring financing constraints therefore offers a useful way of assessing how resilient overseas subsidiaries are financially.

In line with Hadlock and Pierce (2010) [18] and later work, the SA index is used here to capture the financing constraints of overseas subsidiaries. It is built from firm size and firm age, and because it rests on structural characteristics rather than on a firm's own financial decisions, it can be treated as relatively exogenous. The index is less sensitive than investment-cash flow sensitivity measures to how a firm finances itself, and it has been used widely in empirical work on financing constraints. Subsidiary data come from the BvD-Orbis global company database.

3.2.2. Independent Variable

In the digital economy, digital transformation represents a critical strategic capability that shapes firms' resource integration and value creation. It is not simply the adoption of digital technologies; it describes how a firm works digital resources and technologies into its strategic decisions, its operations and its organizational management. Earlier research stresses that digital capabilities help firms operate more efficiently, innovate more effectively and allocate resources better, and that they underpin competitiveness over the longer term [19-20].

Because digital transformation is a multidimensional strategy that resists direct observation, textual analysis of annual reports has become a common measurement route in recent literature. Annual reports reveal where a firm's strategic priorities lie and what occupies management's attention, and the frequency with which digital-related expressions appear indicates how seriously digital initiatives are pursued [21-22]. Following the textual framework of Wu et al. (2021) and Li et al. (2022), the indicator used here counts digital-related keywords in parent companies' annual reports and takes the natural logarithm of that count plus one. The resulting variable serves as a proxy for the level of parent company digital transformation.

3.2.3. Control Variables

Earlier work on multinational enterprises and overseas subsidiary performance guides the choice of controls. Firm-level and host-country characteristics that may bear on subsidiary financing constraints are therefore included [23].

Lagged Subsidiary Asset enters at the subsidiary level, measured as the natural logarithm of total assets in the previous year, and picks up differences in size. Larger subsidiaries generally hold stronger asset bases and find financing easier to obtain.

At the parent company level the controls are Top10, the shareholding ratio of the ten largest shareholders, which stands for ownership concentration and corporate governance, and Current Ratio, current assets divided by current liabilities, which captures short-term liquidity and financial capacity.

Host-country controls are Inflation, GDP per Capita, GDP Growth and Hightech. Inflation stands for macroeconomic stability; GDP per capita captures economic development and market size; GDP growth measures market potential; and Hightech, the share of high-technology exports in manufactured exports, represents technological development. Between them these variables account for differences in macroeconomic conditions and technological environments that can affect how subsidiaries are financed.

4. Empirical Results

Baseline Regression Results

Table 1 gives the baseline estimates of how parent company digital transformation affects the financing constraints of overseas subsidiaries. Subsidiary, host-country and year fixed effects are included, and standard errors are clustered at the parent company and subsidiary levels.

Column (1) holds the benchmark estimates. The coefficient on Digital is -0.0049 , significant at the 1% level. Because the SA index is built so that a smaller value means weaker constraints, a negative coefficient implies that subsidiaries are less constrained where the parent company has gone further with digital transformation. This matches Hypothesis 1 and the theoretical expectation that digital transformation improves a parent company's ability to move financial and informational resources around the multinational network.

Several considerations help account for the negative sign. Digital technologies bring operational and financial information together, so transparency between the parent company and its overseas subsidiaries improves and internal information asymmetry falls. Cross-border coordination and resource allocation also become more efficient, which lets headquarters channel financial support to subsidiaries that need it without delay. And as digital capabilities grow stronger, organizational governance and resource integration improve, which may open up external financing and ease frictions in host-country markets.

The controls behave largely as expected. Lagged Subsidiary Asset carries a negative coefficient significant at the 1% level, so larger subsidiaries tend to be less constrained than smaller ones, which fits the view that bigger firms hold stronger asset bases, enjoy better credit standing and can raise more funds. GDP per Capita is likewise negative and significant, suggesting that subsidiaries in more developed host economies are less constrained. Hightech, Inflation, GDP Growth and Current Ratio show no statistically significant effect in the baseline specification. Top10, by contrast, is negative at the 1% level, so a more concentrated ownership structure at the parent company goes together with weaker financing constraints at the subsidiary.

The baseline results, then, show that parent company digital transformation eases the financing constraints of overseas subsidiaries once subsidiary, host-country and year fixed effects are held constant. The coefficient keeps both its economic and its statistical significance under a fairly demanding specification, which is a reasonable starting point for the robustness, endogeneity, mechanism and heterogeneity work that follows.

Table 1. Results of baseline regression

Dependent Variable:SA	(1)
	Baseline Regression
<i>Digital</i>	-0.0049 (0.0018)
<i>Top10</i>	-0.0006 (0.0002)
<i>Current Ratio</i>	0.0008 (0.0012)
<i>Asset</i>	-0.0289 (0.0014)
<i>Hightech</i>	0.0004 (0.0004)
<i>Inflation</i>	0.0001 (0.0004)
<i>Per capital GDP</i>	-0.0000 (0.0000)
<i>Growth</i>	0.0002 (0.0003)
<i>Constant</i>	3.8759 (0.0190)
<i>Observations</i>	11,094
<i>R²</i>	0.4802

Note: The robust standard errors clustered at the firm level are provided in parentheses. , , and indicate significance levels of 1%, 5%, and 10% respectively.

5. Conclusion and Policy Implications

5.1. Conclusion

In the digital economy, digital transformation has come to serve multinational enterprises as a strategic capability for improving cross-border resource allocation and organizational competitiveness. Panel data on Chinese listed multinational enterprises and their overseas subsidiaries over 2010 to 2024 underpin the analysis of how parent company digital transformation affects the financing constraints of those subsidiaries. High-dimensional fixed-effects models, instrumental variable estimation and a battery of robustness tests together yield evidence on the cross-border spillovers that digital transformation generates inside multinational enterprises.

Four conclusions emerge from the estimates.

The first is that parent company digital transformation eases the financing constraints of overseas subsidiaries. Once subsidiary, host-country and year fixed effects are controlled for, the coefficient on Digital is negative and significant, which points to better access to financial resources and fewer financing frictions for subsidiaries abroad. Hypothesis 1 therefore finds support, and the result sits comfortably with the resource-based view, in which digital capabilities improve a firm's ability to integrate and deploy strategic resources across a multinational network.

Second, the main findings survive a range of robustness and endogeneity checks. Replacing the model specification, dropping the COVID-19 period, and instrumenting with a leave-one-out regional-industry digitalization measure all leave the results intact. The link between parent company digital transformation and overseas subsidiary financing constraints is thus unlikely to be an artifact of specification or endogeneity; it appears to reflect a reasonably stable causal relationship.

Third, the mechanism analysis points to several organizational channels through which the effect travels. Internal information transparency and resource allocation efficiency improve, which bears directly on subsidiary financing constraints, and the labor cost structure of subsidiaries, the internationalization capability of the parent firm and managerial capability are also implicated. Digital transformation, on this reading, is more than an investment in technology. It is an organizational capability that makes cross-border resource coordination and internal capital allocation more efficient.

The heterogeneity analysis completes the picture, showing that the effect is far from uniform across firms and host-country settings. It is more pronounced for subsidiaries in developing countries, for subsidiaries in non-digital industries, and for those attached to parent companies that are not state-owned. Where financing frictions and resource constraints bite hardest, digital transformation appears to deliver larger marginal benefits, which underlines how much organizational capability matters under heterogeneous institutional conditions.

5.2. Policy Implications

The theoretical analysis and the empirical findings together suggest the following implications for enterprises and for policymakers.

Multinational enterprises should keep pushing parent company digital transformation forward in order to strengthen their cross-border resource allocation. It is better treated as a long-term strategic investment than as a short-term technological upgrade. Digital technologies need to be worked into financial management, supply chain coordination and the management of overseas operations, so that headquarters and subsidiaries operate through unified digital platforms. Greater information transparency and real-time resource coordination then improve the efficiency of internal capital markets and let headquarters support overseas subsidiaries more effectively.

Digital governance systems that raise the financing capacity of overseas subsidiaries are the second priority. Parent companies can use digital technologies to tighten financial monitoring, sharpen risk identification and improve capital allocation across subsidiaries in different countries. Pairing digital transformation with better organizational governance and managerial capability helps hold down agency costs and financing frictions inside the group, and such mechanisms leave subsidiaries more resilient when the international environment turns uncertain.

Policymakers have a role as well. Continued promotion of digital transformation among multinational enterprises, together with a better institutional environment for digital development, is warranted. Governments can build out digital infrastructure, encourage digital technologies to be combined with manufacturing and international business activity, and use targeted policy support and financial incentives to draw firms toward adoption. A stronger digital ecosystem helps enterprises allocate resources more efficiently and compete more effectively in global markets.

Policy design should also be differentiated by firm characteristics and host-country environments. Because effects are stronger for non-state-owned enterprises, for subsidiaries in developing countries and for non-digital industries, support should be aimed more precisely at firms whose financing constraints are relatively severe. Policies tailored in this way help enterprises put digital capabilities to work against financing barriers and support the longer-run development of overseas subsidiaries.

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