

**OPINION**

Jung, Heechul

# The Rise of Intangibles and the Decline in Allocative Efficiency

This article examines the slowdown in total factor productivity growth and the decline in potential growth in the Korean economy through the lens of resource allocation efficiency. Despite the growing importance of intangibles for corporate competitiveness, intangible-intensive firms are likely to face structural financing constraints stemming from limited collateral and information asymmetries. As a result, if financial markets and institutional settings fail to adequately adapt the structural shift toward intangibles, resource allocation efficiency in the corporate sector may deteriorate.

Empirical evidence shows that the share of intangible assets in the Korean corporate sector has steadily increased over the past two decades, with particularly pronounced growth in intangible-intensive industries. Moreover, allocative efficiency in the corporate sector is found to have deteriorated between 2003 and 2023, which may have shaved around 0.7 percentage points off average annual economic growth over the period. The deterioration in allocative efficiency is found to stem mainly from misallocation in intangible-intensive industries.

These findings suggest that fundamental improvements in the resource allocation framework are warranted for the rise of intangibles to serve as an opportunity for sustained economic growth. This calls for strengthening capital supply mechanisms for intangible-based firms and fostering a financial and capital market environment that better reflects the distinctive characteristics of intangible assets, thereby promoting productivity-driven resource allocation. In addition, in response to the growing importance of intangible assets, greater efforts are needed to mitigate information asymmetries and to enhance the effective use of information related to firms' intangible assets.

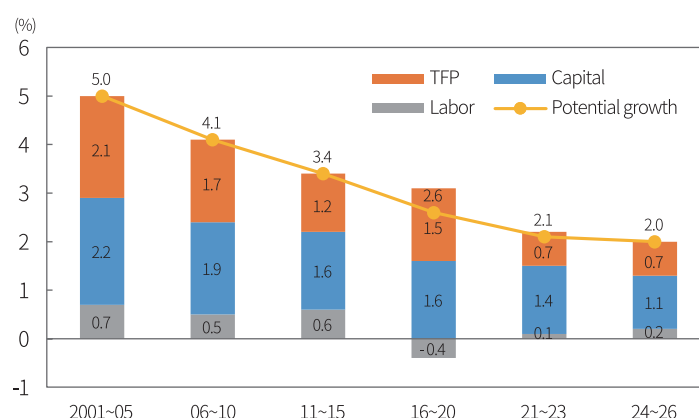
\* The views and opinions expressed in this article are those of the author and do not necessarily represent the official views of the Korea Capital Market Institute.

\* Ph.D., Research Fellow, Macro-Financial Analysis Department, Tel: 82-2-3771-0625, E-mail: hcjung@kcmi.re.kr

## Slowing productivity growth and the importance of allocative efficiency

The Korean economy faces structural challenges characterized by a prolonged slowdown in total factor productivity (TFP) growth and a persistent decline in the potential growth rate (Figure 1). As declining fertility, rapid population aging, and diminishing marginal productivity of physical capital increasingly constrain growth based on quantitative expansions of labor and capital inputs, enhancing productivity in the corporate sector has become a critical determinant of the economy's overall growth potential. However, as TFP growth in the corporate sector itself has also slowed, there are growing concerns that the slowdown in Korea's economic growth may become structurally entrenched.

**Figure 1. Estimates of potential growth and contributions by component**



Source: Lee, E., Cheon, D., Kim, J., & Lee, D., 2024, Potential growth of Korea and its outlook, BOK Issue Note, No. 2024-33, Bank of Korea.

The slowdown in TFP is not unique to Korea, but rather a common phenomenon observed across advanced economies as well as emerging and developing countries.<sup>1)</sup> Both within-firm factors and across-firm resource allocation have been pointed out as key contributors to this trend. With respect to within-firm factors, several explanations have been proposed, including the waning contribution of information technology to productivity growth,<sup>2)</sup> as well as the deceleration in technological progress as the deepening of knowledge accumulation

1) IMF, 2024, World Economic Outlook, April 2024, Chapter 3: Slowdown in Global Medium-Term Growth — What Will It Take to Turn the Tide?

2) Fernald, J. G., 2015, Productivity and Potential Output before, during, and after the Great Recession, *NBER Macroeconomics Annual* 29(1), 1-51.

raises the costs and effort required to generate new ideas and innovations.<sup>3)</sup> In the case of Korea, evidence of declining within-firm efficiency includes productivity stagnation among laggard firms,<sup>4)</sup> weakening business dynamism, and the tendency for quantitative expansions in innovation activities to fall short of delivering commensurate qualitative outcomes.<sup>5)</sup>

Another key determinant of TFP in the corporate sector is the efficiency of resource allocation across firms. Even holding the level of technology and the total quantity of factor inputs constant, reallocating capital and labor from firms with low marginal productivity to those with high marginal productivity can raise aggregate output, and, in turn, aggregate TFP. Such efficiency, however, depends on economic conditions and institutional environments. Financial market frictions, delayed restructuring or exit of nonviable firms, and various institutional rigidities are frequently cited as factors that hinder the reallocation of resources toward more productive firms, thereby reducing allocative efficiency across firms. If these frictions persist, highly productive firms may be unable to fully realize their growth potential, while resources remain locked in less productive firms. This may accumulate and exacerbate resource misallocation across firms, acting as a structural drag on TFP growth in the corporate sector.

### **The rise of intangible assets and the potential decline in allocative efficiency**

The global economy is gradually transitioning from a production structure centered on tangible assets—such as factories, machinery, and equipment—to one increasingly driven by intangible assets, including knowledge, know-how, and organizational capabilities. Between 2008 and 2024, global investment in intangible assets grew at more than three times the pace of investment in tangible assets,<sup>6)</sup> and intangible assets have become an increasingly important source of corporate competitiveness and long-term growth. In particular, the accumulation of intangible assets is widely recognized as playing a critical role in enhancing within-firm productivity and core capabilities through channels such as R&D-driven technological progress,

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3) Bloom, N., Jones, C.I., Van Reenen, J., Webb, M., 2020, Are ideas getting harder to find?, *American Economic Review* 110(4), 1104-1144.

4) Choi, C., Lee, J., & Ham, G., 2018, The widening productivity gap among firms in Korea and its implications for total factor productivity and wage inequality, BOK Issue Note, No. 2018-4, Bank of Korea.

5) Bank of Korea, 2024, Economic outlook (May 2024).

6) WIPO, 2025, World Intangible Investment Highlights 2025.

the accumulation and effective use of knowledge, and improvements in organizational structures and managerial capabilities.

At the same time, however, distortions in resource allocation may intensify if financial markets and institutional environments fail to adequately adapt to the structural rise in firms' reliance on intangible assets. Intangible assets generally involve higher investment risk and greater valuation uncertainty than tangible assets, and are more difficult for outsiders to observe and liquidate. Owing to these characteristics, intangible assets are difficult to use as collateral, and information asymmetries between firms and external investors tend to be more pronounced. As a result, intangible-intensive firms are more likely to face structural constraints in accessing external finance under traditional, collateral-based financial systems. These constraints are likely to be particularly binding for young or unlisted firms.

Consequently, a nontrivial share of highly productive, intangible-intensive firms may remain constrained in their growth despite attractive investment opportunities, due to difficulties in securing sufficient resources. Therefore, if financial markets and institutional environments do not adequately respond to the structural shift toward intangible assets, resource misallocation may intensify, especially in intangible-intensive industries. This, in turn, may act as a structural constraint on improvements in TFP in the corporate sector.

### **The rise of intangibles and sectoral heterogeneity in the Korean corporate sector**

Building on the preceding discussion, this section examines empirical patterns related to the growing importance of intangible assets and sectoral heterogeneity in the Korean corporate sector, and then evaluates the efficiency of resource allocation. For this purpose, firm-level intangible capital stocks are measured using financial data on Korean externally audited firms.<sup>7)</sup> This measure captures both knowledge capital and organization capital, and is estimated by capitalizing R&D expenditures and a fraction of selling, general, and administrative (SG&A) expenses.<sup>8)</sup>

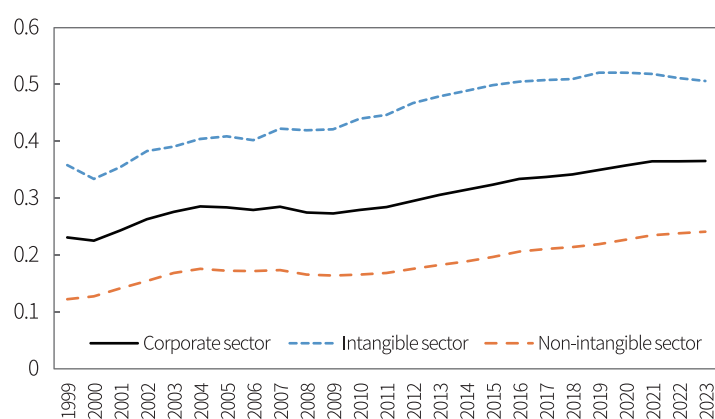
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7) Financial data on Korean externally audited firms are obtained from DataGuide, with the sample period spanning 1999-2023. A detailed description of the data and estimation methodology can be found in Jung, H. (forthcoming), The rise of intangibles and allocative efficiency, KCMI Research Paper.

8) Intangible assets reported on the balance sheet reflect only a limited portion of the intangible assets that firms internally generate, owing to constraints in accounting recognition. To address this limitation, a large body of prior literature has estimated intangible capital by applying the perpetual inventory method to R&D expenditures and SG&A expenses that are expensed on the income statement. This study follows the same methodological approach. For a detailed discussion of this methodology, see, Peters, R.H., Taylor, L.A., 2017, Intangible capital and the investment-q relation, *Journal of Financial Economics* 123(2), 251-272.

Figure 2 plots the time-series evolution of intangible intensity for the overall corporate sector and by industry group, based on aggregated firm-level estimates of intangible capital stocks. Intangible intensity is defined as the share of intangible capital stock in total capital stock, where total capital stock is the sum of intangible capital and tangible assets. Intangible intensity in the corporate sector rose from 23.1% in 1999 to 36.6% in 2023, exhibiting a broadly upward trend over time, aside from a temporary stagnation during the mid-to-late 2000s. This pattern suggests that the asset structure of Korean firms has gradually shifted toward intangible assets.

**Figure 2. Intangible intensity in Korea's corporate sector and by industry group**



Note: Intangible capital intensity is defined as the ratio of aggregated intangible capital stock to aggregated total capital stock (the sum of intangible capital and tangible assets) for the overall corporate sector and each industry group.

Meanwhile, this trend is even more pronounced in industries that are structurally more reliant on intangible assets. Industries are classified as intangible-intensive (hereafter, the intangible sector) if they are ranked in the upper third of the distribution of industry-level intangible intensity averaged over the sample period.<sup>9)</sup> Intangible intensity in the intangible sector rose sharply from 35.8% in 1999 to 50.6% in 2023. While intangible intensity also increased in the non-intangible sector, consisting of all remaining industries, the magnitude of the increase was relatively modest.

9) Under this classification, the intangible sector includes manufacturing industries with relatively high intangible capital intensity—such as pharmaceuticals, computers, and precision instruments—as well as knowledge-intensive service industries, including information services and professional, scientific, and technical services.

## Declining allocative efficiency

Next, to assess allocative efficiency in the Korean corporate sector and across industry groups, reallocation gains are computed.<sup>10)</sup> Reallocation gains are defined as the increase in TFP that would occur if inefficient resource allocation were fully eliminated. Reallocation gains for the corporate sector are obtained by aggregating industry-level reallocation gains using each industry's share of value added in total corporate-sector value added as weights. Similarly, reallocation gains for each industry group are defined as the weighted sum of reallocation gains for the industries within the group, where the weights correspond to each industry's share of value added within the group. Because lower allocative efficiency implies a larger potential increase in TFP from eliminating misallocation, reallocation gains can be interpreted as a measure of the magnitude of allocative inefficiency.

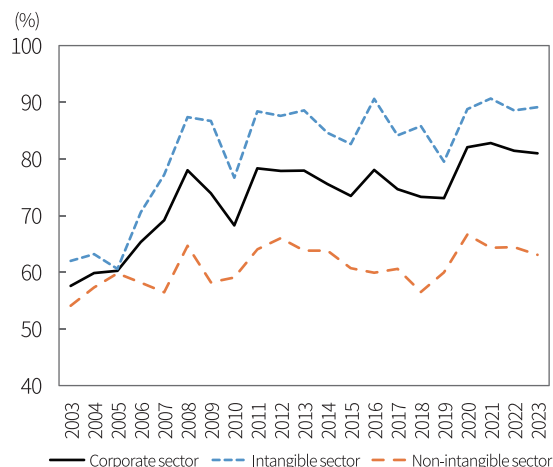
Figure 3 shows the evolution of reallocation gains for the overall corporate sector and by industry group over the period 2003–2023. The results indicate a substantial increase in reallocation gains in the corporate sector over this period, suggesting a long-term deterioration in allocative efficiency within Korea's corporate sector. More specifically, allocative inefficiency in the corporate sector rose sharply in the mid-to-late 2000s, remained persistently high thereafter, and has increased again since the early 2020s.

This decline in allocative efficiency implies that the magnitude of potential output losses due to misallocation increased by approximately 14.8% between 2003 and 2023. When expressed in terms of a compound annual growth rate, this corresponds to about 0.7 percentage points. This suggests that, had allocative efficiency not deteriorated over this period, Korea's average annual economic growth rate could have been around 0.7 percentage points higher.<sup>11)</sup>

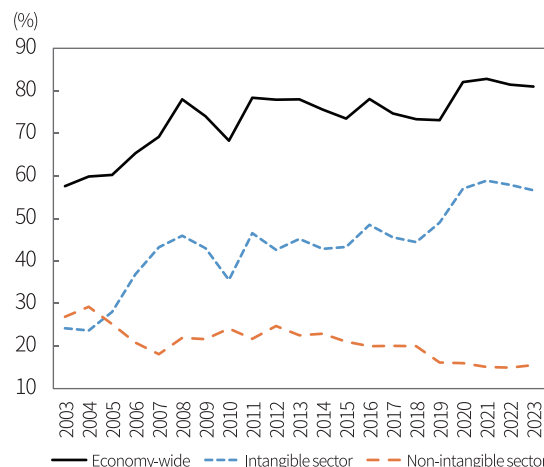
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10) To this end, an extended framework is developed that incorporates intangible capital as an additional factor of production, building on the methodology of Hsieh, C.T., Klenow, P.J., 2009, Misallocation and manufacturing TFP in China and India, *The Quarterly Journal of Economics* 124(4), 1403-1448. Based on this framework, reallocation gains are estimated. A detailed description of the model specification and estimation procedures is provided in Jung (forthcoming).

11) Increases in reallocation gains may capture not only changes in allocative inefficiency but also, to some extent, measurement error and model misspecification. The estimates should therefore be interpreted with caution.

**Figure 3. Reallocation gains for the corporate sector and by industry group**

Note: Reallocation gains for the corporate sector are defined as the increase in total factor productivity (TFP) that would occur if inefficient resource allocation were fully eliminated in all industries. Reallocation gains by industry group are defined as the increase in TFP for a given industry group that would result from eliminating inefficient resource allocation in industries within that group.

**Figure 4. Aggregate TFP gains from reallocation in each sector**

Note: Aggregate TFP gains from industry-group reallocation refer to the increase in TFP for the overall corporate sector that would result from eliminating misallocation only within a specific industry group. Aggregate TFP gains from economy-wide reallocation are identical to the reallocation gains for the corporate sector.

An examination of reallocation gains by industry group shows that reallocation gains in the intangible sector have consistently exceeded those in the non-intangible sector, with the gap widening over the past two decades. This suggests that the observed decline in allocative efficiency in the corporate sector has been driven primarily by rising misallocation within the intangible sector.

Figure 4 provides a more granular view by tracing the evolution of aggregate TFP gains arising from reallocation within each industry group. This measure captures the increase in aggregate TFP in the corporate sector that would result from eliminating misallocation only within a given industry group. The results show that aggregate TFP gains associated with reallocation in the intangible sector have increased markedly over the past two decades. As a consequence, the share of total corporate-sector reallocation gains attributable to misallocation within the intangible sector rose sharply, from about 42% in 2003 to around 70% in 2023. By contrast, the share attributable to misallocation within the non-intangible sector exhibits a broadly declining trend over the same period. Taken together, the deterioration in

allocative efficiency in the corporate sector reflects the combined effects of rising within-sector misallocation in intangible-intensive industries and structural shifts toward these industries, which account for an increasing share of value added despite exhibiting relatively severe allocative inefficiencies.

### **Policy implications**

These findings point to the importance of fundamentally improving resource allocation mechanisms to bolster Korea's growth potential in an economy increasingly driven by intangible assets. In particular, the expansion of allocative inefficiency observed in intangible-intensive industries suggests that existing financial and institutional environments may not have adequately supported the transition toward an intangible-based economy. Accordingly, to strengthen the positive role of intangible assets and to secure sustainable sources of growth through productivity improvements in the corporate sector, the following policy efforts are warranted.

First, there is a need to strengthen capital supply mechanisms for intangible-intensive firms. Intangible-based firms—particularly young or unlisted firms—are more likely to face structural constraints on financing and growth under traditional financial systems that rely heavily on tangible asset-based collateral.<sup>12)</sup>

To mitigate these constraints, it is important to strengthen the expertise and expand the role of professional investors and financial intermediaries that can evaluate intangible-based firms' growth potential and innovation capacity, and are willing to bear risk and uncertainty in supporting their growth. At the same time, continued efforts are needed to enhance capital market development so as to improve market access for young or unlisted firms and enable firms to raise financing smoothly across different stages of their growth. In addition, the institutional framework for intellectual property (IP) finance should be further strengthened to allow firms that generate valuable IP to secure funding more effectively and diversify their financing channels based on their intellectual assets.

Second, it is necessary to foster an information environment that mitigates information

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12) Additional analysis suggests that allocative inefficiency within the intangible sector is largely driven by firms that are constrained in their growth due to insufficient access to resources relative to their productivity. These growth constraints are particularly pronounced among young and unlisted intangible-intensive firms.

asymmetry between firms and investors in response to the growing importance of intangible assets. Along with collateral constraints, information asymmetry is considered as a key factor that exacerbates financing frictions for intangible-intensive firms. Accordingly, sustained discussion is warranted regarding how intangible asset-related information is generated, transmitted, and utilized in capital markets, so that such information can be more effectively incorporated into the decision-making of market participants. At the same time, a balanced approach is needed—one that enhances the usefulness of information while also ensuring reliability and investor protection.

Taken together, these efforts are expected to help alleviate growth constraints faced by intangible-intensive firms with financing difficulties and to promote the reallocation of resources toward more productive firms with greater growth potential, thereby contributing to improvements in allocative efficiency and aggregate TFP in the corporate sector.