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# The Firstborn Advantage: Birth Order and Resource Allocation of the Joseon Royal Family in the Late Thirteenth- to Mid-Sixteenth-Century Korea

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**Abstract**

This study examines the strategies employed by elite families to maintain their sociopolitical status, with a particular focus on resource allocation among offspring. Based on the royal genealogies of Joseon Dynasty (*Seonwonrok jokbo*), which span from the late Goryeo (late thirteenth century) to the early Joseon (mid-sixteenth century) periods, the study uses logit regression analysis to identify patterns of inheritance. The findings indicate that birth order palyed a significant role in resource distribution, with eldest sons disproportionately occupying elite bureaucratic positions. Challenging the assumption of egalitarian inheritance prior to widespread Confucian norms, this study argues that the early Joseon royal family had already embraced primogeniture-like practices, predating Korea's broader societal shift toward patrilineal inheritance in centuries that followed.

**Keywords**

firstborn advantage, birth order, Joseon dynasty, elite families, resource distribution

## Introduction

The allocation of family resources among offspring has long been a central theme in family history and the social sciences. Much of the related research focuses on the various strategies elite families have employed to preserve their social and economic dominance across generations. One particularly prominent strategy is the prioritization of birth order - especially favoring firstborn sons through practices such as primogeniture. By concentrating inherited wealth and privileges

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in the hands of the eldest heir, elite families could prevent the fragmentation of their assets and protect their collective social standing. These strategies also contributed to political stability, as dynastic continuity often aligned with state capacity and efforts at centralization. However, this arrangement led to a diminishing of "inherited privilege" for younger siblings and collateral relatives, compelling them to seek alternative routes—such as entering state service or forging advantageous marriages—to secure their positions within the elite.[1]

Primogeniture was one of salient phenomena in pre-modern societies, including historic Austria, Western Europe, the Muslim and Japanese societies.[2] In medieval Europe, inheritance practices varied considerably, but primogeniture—the system in which the eldest son inherits most or all of the family's property—gained prominence mainly from the late medieval period onward. This system aimed to prevent the fragmentation of estates and preserve dynastic continuity, a goal strongly supported by the Catholic Church. High-ranking noble families, such as the Capetian dynasty and leading houses of the Holy Roman Empire, exemplified this trend. However, these cases were exceptions rather than the rule among the broader nobility. With the rise of industrialization, inheritance customs adapted to new economic realities, shifting from land-based assets to capital and industrial holdings, and encouraging more flexible divisions of property among heirs.[3]

In East Asia, Japan represented a distinct case of rigorous primogeniture within its stem-family structure, emphasizing inheritance by the eldest son to ensure familial unity and continuity across generations.[4] In contrast, China historically practiced a more equitable distribution of property among sons. During the Ming (1368–1644) and Qing (1644–1912) dynasties, the eldest son held important symbolic and ritual responsibilities, particularly in conducting ancestral rites. To support these obligations, he was granted only modest additional resources, rather than significant economic privileges. This arrangement, well-documented in contemporary legal codes and genealogical records, illustrates the careful balance between Confucian ideals and pragmatic family management.[5]

During the Goryeo (918–1392) and early Joseon (1392–1910) periods, Korea's inheritance customs were comparatively egalitarian, with property distributed evenly among all offspring, including daughters.[6] This rule of equal sharing has drawn significant attention from social science researchers, particularly those interested in comparing the steady-state distribution of income under primogeniture with that of equal division.[7] While primogeniture is often associated with heightened income inequality, the "compensatory reinforcement" explanation suggests that unequal bequests can serve to support children with differing economic abilities.[8] Adam Smith emphasized the economies of scale in landholding to argue that primogeniture was "introduced to preserve a certain lineal succession."[9] Chu's (1991) lineal model similarly frames dynasties as entities whose members behave in ways that minimize the probability of lineal or dynastic extinction.[10] Within this framework, bequests are directed to the child most capable of carrying on the family line and/or family business.[11]Consequently, the dynasty model underscores how such practices reinforced restricted social mobility across generations.

We find that the dynasty model aligns closely with Confucian patrilineal norms, which became firmly established in Korea by the sixteenth and seventeenth centuries, bringing its inheritance practices into closer conformity with those of imperial China.[12] From the sixteenth century onward, Korean customs increasingly reflected Confucian patrilineal ideals, mirroring contemporary Chinese practices. This evolution underscores the adaptability of inheritance systems to shifting ideological, cultural, and socio-political contexts. Notably, our analysis shows that even before the sixteenth century, members of the royal family adhered to a hierarchical structure that favored the eldest son in the distribution of titles, material resources, and governmental appointments.[13] This suggests that the prioritization of sons in Korea—often associated with later societal transformations—had already taken root within the Joseon royal family during the late thirteenth to mid-sixteenth centuries. Furthermore, we examine the strategies employed by royal

family members without direct claims to the throne to preserve their "dynastic privilege." As their fortunes waned, many pursued alternative avenues of influence, such as success in the civil service examinations (gwageo) or strategically arranged marriages that secured alliances with other powerful families.[14]

After outlining a simple dynasty model, this study turns to empirical evidence of favoring the eldest son in families with a high likelihood of perpetuating the family line. The comprehensive dataset is drawn from the genealogical records of its founders (*Seonwonrok jokbo*) that extends back from the late thirteenth century of the Goryeo period through to the sixteenth century. This extensive dataset enables a rigorous analysis of the systematic advantages conferred upon eldest sons in the royal family. With a high likelihood of perpetuating the family line. By incorporating information on paternal and maternal lineage, as well as the hierarchical ranks of fathers, grandfathers, and fathers-in-law, this study employs logit regression to quantify the "firstborn advantage." The results show that the royal family deliberately concentrated resources on eldest sons, leveraging their positions within the bureaucratic and political hierarchy to reinforce elite dominance, even while egalitarian inheritance norms persisted in broader society.

Placing these findings in comparative perspective, the study juxtaposes European models of primogeniture with Confucian-based inheritance practices in East Asia. It demonstrates how Confucian ideals, combined with dynastic strategies, sustained elite continuity in medieval Joseon Korea, even as the privileges of royal lineage declined for those outside the direct line of succession. In doing so, the study contributes to a more nuanced understanding of the relationship between birth order and the reproduction of elite status.

## Background

In this section, we elucidate the historical significance of marriage during the Joseon dynasty and provide background on the historical records used for data generation.

### *Dynastic Transition and Institutionalization of the Royal Family*

In 1392, Yi Seong-gye, coronated as King Taejo, founded the Joseon dynasty (1392–1910) after denouncing the inefficiency and corruption of the Goryeo court. It was not a mere regime change but also represented a profound restructuring of Korea's elite power dynamics. Aristocratic families who had prospered under Goryeo realigned their interests with the Neo-Confucian state. This strategic alignment allowed aristocratic families to preserve their privileges while endorsing Joseon's centralizing reforms.[15]

The transition to the Joseon dynasty was a pivotal moment that fundamentally redefined its political and social order. In its early years, Joseon inherited and retained elements of Goryeo's egalitarian inheritance practices, in which resources were distributed relatively equally among all offspring, including daughters.[16] These practices prioritized familial cohesion and collective welfare, reflecting the sociopolitical ethos of the preceding dynasty. However, these norms increasingly conflicted with Neo-Confucian ideals, which emphasized patrilineal succession and the concentration of resources in the firstborn son to ensure the stability of the family lineage and the state. This juxtaposition highlights the transitional nature of early Joseon, where long-standing egalitarian norms gradually gave way to hierarchical inheritance systems.[17]

### *Genealogical Records and Marriage Networks as Pillars of Authority*

King Taejo prioritized the organization of a comprehensive royal family to secure political stability and social order in the newly founded dynasty. The royal genealogy, initially organized

under King Taejo, laid the foundation for future compilations, such as the *Seonwonrok*, *Donnyeongbocheop*, and *Seonwongyebogiryak*. These records became central to the political and social framework of the Joseon dynasty. Over the following decades, these genealogical practices continued to evolve, with the reign of King Seongjong (1469–1494) marking a critical period in the formalization of this process.[18]

By 1495, Joseon had transitioned from a formative state of instability to a consolidated governance structure. Genealogical records from this period offer valuable insights into the dynasty's transitional dynamics, highlighting the gradual shift from egalitarian inheritance practices to hierarchical principles that paralleled the primogeniture policies of medieval Europe and Confucian East Asia. This transition, however, was neither abrupt nor uniform; it was a negotiated process that blended inherited norms with new ideological imperatives. The yangban emerged as a distinct social group within the hierarchical structure of the Joseon Dynasty. Although Joseon society broadly classified individuals into two main categories—*cheonmin* (賤民), who performed menial tasks, and *yangin* (良人), who were free commoners eligible to pay taxes and participate in civil examinations—the expansive size and ambiguous definition of the *yangin* class allowed for further social differentiation.[19] Within this framework, the yangban established themselves as an elite subgroup, distinguished not by hereditary caste but by cultural prestige, scholarly achievements, and their direct connection to government service. Achieving yangban status required successfully passing the state-administered *gwageo* examinations, securing official government positions, and embodying the Confucian ideals and social norms of the scholarly-official class. High scorers in these examinations secured prominent bureaucratic roles, substantial economic benefits, and elevated social standing, thereby reinforcing their identification and reputation as *yangban* within Joseon society.[20]

Marriage alliances complemented the role of genealogical records, serving as a mechanism to integrate Korea's most influential *yangban* families into the royal framework. These unions simultaneously enhanced the monarchy's legitimacy and offered elevated status and privileges to allied families. The *muneum* privilege, which allowed descendants of such families to bypass competitive civil service examinations, further entrenched the integration of these elite networks into the state apparatus. By institutionalizing these practices, Joseon created a stable governance system that balanced centralized authority with the preservation of aristocratic influence.[21]

## *The Role of Confucian Values in Structuring Governance and Inheritance*

The gradual adoption of Neo-Confucian principles in Joseon governance is most evident in its transition toward primogeniture (*jangja*). In its early years, this system was not universally applied; instead, the dynasty reflected remnants of Goryeo's egalitarian practices. However, by the mid-sixteenth century, primogeniture became entrenched as a cornerstone of Joseon's governance model, aligning with broader efforts to harmonize state administration with Confucian ideals of filial piety and lineage continuity. The firstborn son was increasingly prioritized in the allocation of wealth, titles, and responsibilities, ensuring the consolidation of resources and the stability of the family and state.[22]

Joseon's genealogical records provide compelling evidence of the monarchy's transitional status in the global context of inheritance systems. These records illustrate the shift from Goryeo's egalitarian norms to hierarchical principles that mirrored developments in medieval Europe as well as Ming and Qing China. In Europe, primogeniture served as a mechanism to preserve estates and consolidate aristocratic power, while in China, it reinforced patrilineal succession and ritual obligations. Joseon's approach integrated these broader trends with local practices, such as strategic marriage alliances and the codification of royal lineage, creating a governance system that blended ideological conformity with practical governance needs. Through these

genealogical and institutional innovations, Joseon effectively navigated its transitional period, ensuring the dynasty's resilience and longevity. By the mid-sixteenth century, primogeniture had become firmly established as a defining feature of the royal family's governance, reflecting a broader regional pattern of elite consolidation and hierarchical resource allocation.[23]

## Data

In this section, we describe the data sources, structure, and statistical properties of the variables used in the analysis. The dataset consists of marriage and lineage information from four royal clans of the early Joseon period. We first explain why certain families in the dataset warrant particular scholarly attention, highlighting their characteristics through summary statistics. We then detail the process of converting textual genealogical records into numerical data, thereby enabling a clearer interpretation of the statistical results within their historical context.

### *Historical Records: Seonwongyebogiryak (璿源系譜紀略) and Donnyungpuchep (敦寧譜牒)*

The selected clans are well-known for their privilege and legacy, as evidenced by their notable achievements in producing government officials, particularly those who have passed the *Gwageo* exams. During the Joseon Dynasty, entry into officialdom for *yangin* (commoners) was primarily facilitated through three institutionalized channels: the civil service examination system known as *gwageo* (科擧), the hereditary protection privilege termed *muneum* (門蔭), and the recommendation-based appointment system, *cheongeo* (薦擧). Among these pathways, the *gwageo* emerged as the dominant method, lauded by contemporaries for its perceived fairness and efficiency. Importantly, the *gwageo*'s meritocratic character closely aligned with royal interests, enabling monarchs to consolidate political authority and mitigate the influence of entrenched bureaucratic elites by periodically refreshing the composition of government offices. Thus, the *gwageo* served as a mechanism for disseminating Confucian administrative ideals by recruiting capable new officials. Significantly, even individuals born into elite families were compelled to validate their abilities through the *gwageo* to advance within the bureaucratic hierarchy.[24]

We compiled a list of historical figures who married into the royal family, drawing from two documents that detail their family relationships and the official positions held by their relatives. Figure 1 shows images of these documents.

Shown in the left half of Figure 1, the *Seonwongyebogiryak* is a genealogy of the royal family during the Joseon dynasty. The term *Seonwon* (璿源) means "the fundamental source of beautiful jade" (玉), symbolizing the royal lineage. *Seonwongyebogiryak* became the most prominent royal genealogy and was continuously updated to reflect the expanding network of the royal family. During King Seongjong's reign (1469–1494), it was significantly expanded and formalized, incorporating not only direct descendants but also collateral relatives and marriage alliances with influential *yangban* families. It had been published since 1681 and was renewed during the seventh year of King Sukjong's reign. In the following centuries, it was revised over a hundred times until 1933. Although other royal family genealogies have been compiled since the Goryeo period, the exact forms of these genealogies are not well-documented.[25]

Depicted in the right half of Figure 1 is a historical document known as *Donnyungpuchep*. Unlike the *Seonwongyebogiryak*, the *Donnyungpuchep* contains relatives who were not part of the *Jongchinbu*. *Donnyungpuchep* was a genealogical record specifically focused on the collateral branches and maternal relatives of the Joseon royal family. It complemented the more comprehensive *Seonwonrok* by detailing the relationships between the royal family and external


**Figure 1.** *Seonwongyebogiryak* (璿源系譜紀略, left) and *Donnyungpuchep* (敦寧譜牒, right).

families, particularly through marriage alliances. The *Donnyeongbocheop* emphasized the roles of royal in-laws and collateral members in supporting the monarchy, showcasing the importance of external alliances in maintaining political and social stability. Regularly updated, it served as a critical tool for managing the royal network and integrating influential families into the state's governance framework.[26]

The royal genealogical records played a vital role in maintaining political stability by providing a clear framework for succession and reinforcing the legitimacy of the reigning monarch. They also institutionalized Confucian ideals, emphasizing patrilineal succession, hierarchical order, and the integration of collateral royals and maternal relatives into the broader political system. By documenting strategic marriage alliances, these records supported the monarchy's influence and strengthened its social and political networks.

## *Descriptive Statistics*

The historical records of royal marriage alliances during the Joseon dynasty are documented in *Seonwongyebogiryak* and *Donnyungpuchep*, both of which are official records published by the government. However, neither of these records is available as a computerized dataset. To address this, we first undertook the task of digitizing these records.

After compiling the dataset, we manually coded the information of individual figures from the historical records into numerical values. The data annotation process was carried out by experts specializing in the history of the Joseon dynasty. This process involved extracting information on individuals related to the king and queen as recorded in *Seonwongyebogiryak* and *Donnyungpuchep*. In addition to individual details, the data included information about family members, such as fathers, grandfathers, mothers, grandmothers, spouses, and fathers-in-law. Furthermore, personal details—including each individual's birthplace/origin and social

standing—were also incorporated. The resulting dataset compiles information on royal marriages from 1392 to 1495, encompassing individuals within the royal marriage network.

In this study, the term *ego* refers to the central figure of analysis within each generational line. A binary variable called biological link indicates whether the individual is a direct bloodline descendant or not. Specifically, "1 in blood" refers to individuals who are biological children, coded as 1, while those connected through adoption or collateral ties are coded as 0. Similarly, "Gender (1 if Male)" refers to the biological sex of the individual, with 1 indicating male and 0 indicating female. Importantly, women were not permitted to hold official ranks during the Joseon dynasty. Thus, mothers' ranks are recorded as zero, and in cases involving daughters, we use the rank of their husbands (sons-in-law) as a proxy for their family status. In addition, government ranks follow an eighteen-tier system from the Joseon dynasty and are converted to a continuous numeric scale ranging from 1 (highest) to 18 (lowest). A value of 0 indicates that the individual held no official position, rather than missing data. The average rank for each generation is calculated by summing all individual rank scores within that generation—including zero scores—and dividing by the total number of individuals.

To analyze how the ruling elite group, including the royal family, allocated resources to maintain their power, the collected individuals must be divided and analyzed by generation. Table 1 breaks down the refined data into generational groupings and provides descriptive statistics of the variables used in the analysis. The total number of individuals used in the analysis is 4,482, with information collected across nine generations covering the period from the Joseon dynasty's founding in 1392 to 1495.

As shown in Table 1, the generation with the most individuals is the sixth generation, while the first generation has the highest average official rank attainment. The second generation had the most children, but after that, the number of children declined across generations. A noticeable increase in the number of observations starts from the fourth generation, and a sharp decline occurs after the seventh. This pattern is attributed to the characteristics of historical genealogy records, where earlier generations selectively include prominent ancestors and later generations often have incomplete documentation.

Table 1 also illustrates the changes before and after implementation of the *gwageo* civil examination. The average rank of individuals from the first to fourth generations—prior to the *gwageo*—was 1.32, which was higher than the average rank of 1.13 for individuals from the fifth to ninth generations, after the examination was established. This suggests that individuals from the first to fourth generations inherited official positions more stably compared to those from the fifth generation onward, reflecting a shift from lineage-based appointments to a more meritocratic selection process. In line with this historical shift, we calculated descriptive statistics separately for pre-*gwageo* (first to fourth) and post-*gwageo* (fifth to ninth) generations.

To provide clarity and standardization, Table 1 includes the mean and standard deviation for all continuous variables, as well as percentages for categorical variables. Minimum and maximum values were omitted to avoid unnecessary complexity, as the key distributional information is adequately conveyed through the mean and standard deviation. Also, missing values in the dataset—such as absent official positions or kinship information—were recoded as zeroes, as they carry substantive meaning in this context rather than indicating data loss. Furthermore, the high number of siblings and offspring observed in some cases—up to 22—is historically accurate and reflects the widespread practice of polygyny and concubinage among elite families during the Joseon dynasty.

Figure 2 presents generation-level patterns in government rank and family size. Specifically, it compares the average official rank of parents with that of their children. The figure shows that parents, on average, attained higher ranks than their children, suggesting a general decline in official rank across generations. Additionally, the average number of siblings decreases over

**Table 1.** Summary Statistics by Generation.

| Generation | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1st | 2nd | 3rd | 4th | Total (1–4) | 5th | 6th | 7th | 8th | 9th | Total (5–9) |
| Number of individuals | 13 | 35 | 176 | 595 | 819 | 1,017 | 2,440 | 72 | 88 | 46 | 3,663 |
| Gender (1 if Male) | 13 | 25 | 94 | 322 | 454 | 557 | 1,330 | 57 | 69 | 43 | 2,056 |
| Biological link (1 in blood) | 13 | 25 | 94 | 325 | 457 | 574 | 1,335 | 57 | 69 | 43 | 2,078 |
| Ego's rank attainment* | | | | | | | | | | | |
| Average | 2.39 | 2.04 | 1.38 | 1.24 | 1.32 | 1.29 | 1.09 | 1.17 | 0.16 | 0.41 | 1.13 |
| Standard deviation | 1.07 | 1.32 | 1.42 | 1.35 | 1.38 | 1.33 | 1.27 | 1.29 | 1.12 | 0.92 | 1.28 |
| Birth order* | | | | | | | | | | | |
| Average | 1 | 5.28 | 9.02 | 4.86 | 5.71 | 3.73 | 3.85 | 3.26 | 2.71 | 1.69 | 3.75 |
| Standard deviation | 0 | 4.31 | 8.28 | 4.72 | 5.90 | 2.93 | 3.34 | 2.25 | 1.61 | 0.86 | 3.17 |
| Father's rank attainment* | | | | | | | | | | | |
| Average | 0 | 2.24 | 2.08 | 2.16 | 2.12 | 2.19 | 2.01 | 1.29 | 0.90 | 0.81 | 2.01 |
| Standard deviation | 0 | 1.24 | 1.29 | 1.19 | 1.24 | 1.08 | 1.13 | 1.38 | 1.23 | 1.18 | 1.15 |
| Father's birth order* | | | | | | | | | | | |
| Average | 15 | 1 | 3.29 | 10.03 | 8.27 | 4.16 | 3.58 | 1.84 | 3 | 1.61 | 3.67 |
| Standard deviation | 0 | 0 | 3.51 | 8.28 | 7.93 | 4.09 | 2.84 | 1.11 | 1.71 | 0.80 | 3.21 |
| Mother's rank attainment* | | | | | | | | | | | |
| Average | 0 | 0.94 | 0.13 | 0.05 | 0.11 | 0.02 | 0.01 | 0 | 0 | 0 | 0.01 |
| Standard deviation | 0 | 1.41 | 0.62 | 0.38 | 0.55 | 0.24 | 0.16 | 0 | 0 | 0 | 0.18 |
| Maternal father's rank* | | | | | | | | | | | |
| Average | 0 | 0.93 | 0.21 | 0.44 | 0.41 | 0.04 | 0.03 | 0.84 | 0.52 | 0 | 0.06 |
| Standard deviation | 0 | 1.40 | 0.75 | 1.06 | 1.02 | 0.36 | 0.28 | 1.32 | 1.07 | 0 | 0.41 |
| Paternal father's rank* | | | | | | | | | | | |
| Average | 0 | 0 | 0.03 | 1.13 | 0.83 | 1.62 | 1.49 | 1.09 | 1.04 | 1.46 | 1.51 |
| Standard deviation | 0 | 0 | 0.31 | 1.45 | 1.33 | 1.48 | 1.48 | 1.41 | 1.37 | 1.41 | 1.48 |
| Spouse's rank* | | | | | | | | | | | |
| Average | 0.23 | 1.01 | 1.26 | 1.11 | 1.12 | 1.06 | 0.93 | 0.32 | 0.22 | 0.05 | 0.92 |
| Standard deviation | 0.83 | 1.41 | 1.42 | 1.33 | 1.35 | 1.31 | 1.23 | 0.87 | 0.71 | 0.34 | 1.24 |
| Rank of spouse's father* | | | | | | | | | | | |
| Average | 0.23 | 1.03 | 1.34 | 1.27 | 1.26 | 1.23 | 1.20 | 0.38 | 0.31 | 0 | 1.15 |
| Standard deviation | 0.82 | 1.44 | 1.47 | 1.44 | 1.45 | 1.38 | 1.33 | 0.97 | 0.86 | 0 | 1.34 |

(continued)

**Table 1.** Continued.

| Generation | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1st | 2nd | 3rd | 4th | Total (1–4) | 5th | 6th | 7th | 8th | 9th | Total (5–9) |
| Number of father's siblings | 0 | 1 | 10.24 | 22.01 | 18.25 | 7.65 | 5.32 | 2.79 | 3.69 | 2.43 | 5.84 |
| Rank of father's siblings | | | | | | | | | | | |
| Average | 0 | 0 | 0.76 | 0.75 | 0.71 | 0.99 | 0.97 | 0.51 | 0.73 | 0.68 | 0.96 |
| Standard deviation | 0 | 0 | 0.65 | 0.67 | 0.63 | 0.25 | 0.23 | 0.25 | 0.51 | 0.16 | 0.24 |
| Number of ego's siblings | 1 | 7.94 | 15.84 | 6.51 | 8.49 | 4.73 | 3.88 | 3.38 | 2.81 | 2.17 | 4.06 |
| Rank of ego's siblings | | | | | | | | | | | |
| Average | 0 | 0.58 | 0.63 | 0.89 | 0.81 | 0.97 | 0.94 | 0.83 | 0.57 | 0.32 | 0.93 |
| Standard deviation | 0 | 0.52 | 0.52 | 0.28 | 0.33 | 0.21 | 0.14 | 0.34 | 0.32 | 0.16 | 0.16 |
| Number of ego's children | 1.84 | 2.68 | 1.82 | 1.13 | 1.36 | 1.49 | 0.02 | 0.92 | 0.45 | 0 | 0.45 |
| Rank of ego's children | | | | | | | | | | | |
| Average | 2.71 | 1.49 | 0.95 | 0.51 | 0.68 | 0.67 | 0.01 | 0.31 | 0.09 | 0 | 0.20 |
| Standard deviation | 0.11 | 0.15 | 0.09 | 0.03 | 0.05 | 0.04 | 0 | 0.16 | 0.04 | 0 | 0.01 |

*Note:* Values denoted by asterisk (*) are averages calculated at the generation level.
*Source:* Author's data.

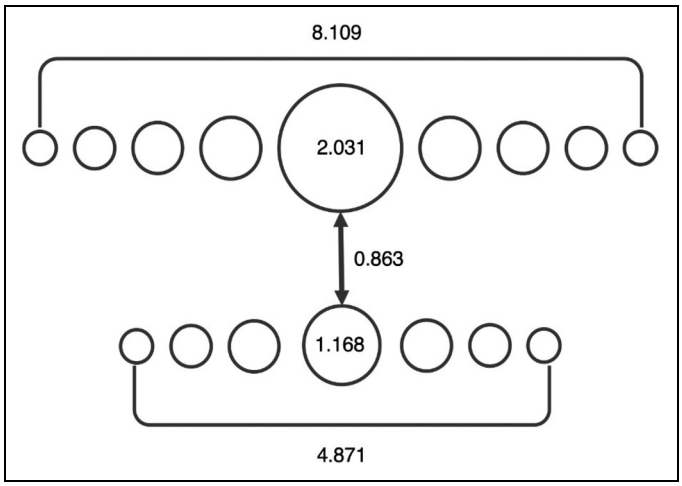


**Figure 2.** The Average Flow of Power Between Parents and Their Children.

generations: the mean number of siblings in the parent generation is 8.109, while it drops to 4.871 in the ego generation. These findings reflect broader trends in elite family dynamics over time. However, it is important to note that this figure is designed to capture macro-level (generational) trends rather than detailed family-level analysis. Finally, we interpret these patterns in the context of the historical expansion of government functions during the Joseon dynasty, which likely increased the number of available positions and may partly explain the observed rank distributions.

Following the classification system proposed by Hong et al. (2021), government positions were categorized into three ranks: high, middle, and low. Figure 3 illustrates the proportion of firstborn sons in government across different generations. From the first to the fourth generation, firstborn sons accounted for more than 50% of high-ranking officials, reflecting the privileges conferred by a lineage-based system. During this period, descendants within four generations of a royal progenitor were eligible for reserved positions in government bureaus, allowing firstborn sons to disproportionately benefit due to their prioritized access to resources, titles, and political opportunities. In contrast, their representation in middle and low-level positions was minimal, highlighting the concentration of privilege within elite ranks.[27] Starting from the fifth generation, the proportion of firstborn sons in high-ranking positions begins to decline, while their representation in middle- and low-ranking groups increases. This trend reflects a gradual weakening of lineage-based advantages.

In Figure 3, for each generation, the number outside the parentheses indicates the count of firstborn sons who fall into each rank group (high, middle, or low), and the number inside the parentheses shows the proportion of firstborn sons in that group relative to all firstborn sons in the same generation. These statistics demonstrate that while firstborn sons initially held a strong advantage in gaining high ranks, this pattern weakens in later generations.

Then, would that mean the firstborn advantage only applied when parents could directly appoint their sons to high-ranked positions? If we find that a firstborn son has a significantly higher probability of earning high-ranked positions, even when he must pass through a meritocratic appointment system like the *gwageo*, it will provide notable evidence in support of the firstborn advantage. Our data allow us to detect the firstborn advantage in two different samples: (1) firstborns within the first four generations directly appointed as high-ranked officials, and (2) those born into the fifth or later generations who took the *gwageo* exam.

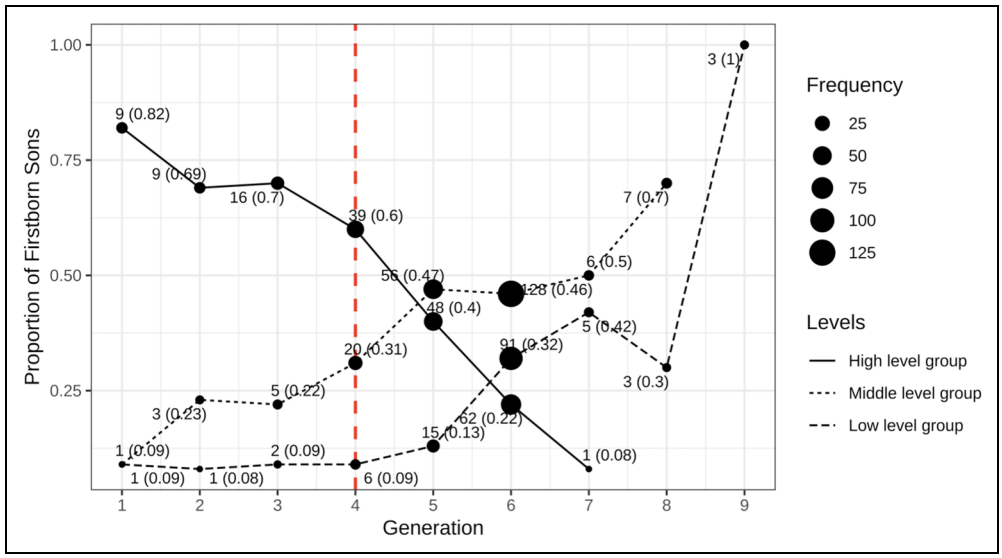


**Figure 3.** Rate of Firstborn Sons in Government Office, by Generation and Rank Attainment.

Based on the historical background summarized in this section, we present a theoretical and statistical model in Model section to analyze whether the firstborn's biological, economic, or social advantages resulted in a higher probability for firstborn sons in both samples to achieve high-ranked positions.

## Model

In this section, we discuss the theoretical background and regression models related to the firstborn advantage (hereafter: the first-child effect). We review a simple dynastic model to introduce the first-child effect as a reduced-form outcome of family heads' optimal decision to minimize the probability of lineal (dynastic) extinction (or to maximize the probability of perpetuating/keeping the family line). Later, we will introduce a linear regression model based on the necessary conditions for the family's optimal resource allocation plan. We will then discuss the expected roles of the independent variables implied by these conditions.

## Theoretical Model

To understand the intergenerational link between young and old, we consider a representative agent model of families with two overlapping generations. A family's objective is to maximize the dynastic utility $U(\cdot)$, which is a function of two generations' consumption. The dynastic utility function $U(\cdot)$ represents a family's overall welfare by considering well-being, utility, or value across two generations. The dynasty model has been widely used in the household economics literature from Barro and Becker (1988, 1989) to Gayle, Golan, and Soytas (2018) and applied to model dynastic transfers explaining the persistent income across generations (Loury, 1981) and transmission of human capital (Laitner, 1982).[28] This form is particularly useful to model different interaction styles across families or cultures while explaining that the utilities of parents and heirs are dependent on resource distribution between them. With the function's large degree

of freedom, we can extend it to the utility function of a dynastic (large) family, comprised of multiple couples and siblings in the premodern era.

We assume that a family aims to maximize dynastic utility, which increases with each generation's government office rank attainment. In an economic sense, the total utility level increases with household consumption, which is in a positive relationship with the level of wealth totaling all types of stipends such as salary, land, capital gains from estate, and any type of assets including servants. With the economic understanding on the official rank, the utility function comprises the rule of diminishing marginal utility, satisfying necessary conditions for its concavity: the marginal increase in utility from one additional rank for those who are highly ranked declines.[29]

Each family consists of a two-period life cycle: the young (or son $j = son$) and the old (or father $j = father$). An individual family maximizes its utility function such as:

$$U(c_{son}, c_{father}) \tag{1}$$

where $U(\cdot)$ is the (nonlinear) utility function composed by the young (let us call him "John, Jr.") generation's government rank ($c_{son}$) along with his father ("John")'s ($c_{father}$). For simplicity, we make additional assumptions. First, a young son is introduced into the family's function with his appointment as a worker with $c_{son}$. He is considered in the utility function until his own son (John, Jr.) starts working. Second, we assume that every son's life is not different from his father's. For example, when John was born at $t = 1$ with his rank $c_{son}$, his father (John, Jr's grandfather)'s rank was denoted by $c_{father}$. With this assumption, we simplify a representative family's $U(\cdot)$ into a dynastic utility function of $U(c_{son}, c_{father})$ at every $t$. Subsequently, the solutions of the optimal resource allocation among family members are considered stationary. By the stationarity assumption, every son's life and his optimal allocation are considered the same from his birth with $c_{son}$ to the old stage with $c_{father}$ as to mirror the life cycle of his father without worrying about abrupt changes in a family structure within the early Joseon dynasty.

A utility maximization problem is subject to a family's resource constraints. Analyses of resource constraints have been found extensively in the literature as a principle of microeconomics[30] to discuss the roles of resource differences across households in explaining wealth inequality and social mobility. Such analyses have led to empirical research investigating the statistical significance of legacy, bequest, and intangible family assets in determining the socioeconomic status of families.[31] Although most empirical evidence is based on data from a modern society, this research has utilized large datasets covering information of multi-generations from families across the socioeconomic spectrum in a pre-modern society.[32]

What has been neglected so far in the existing literature is modeling how families strategize their resource allocation plans to achieve their long-term goals. The long-term development of a family legacy involves actively cultivating and passing down core values, traditions, and tangible assets across generations. This ensures a sense of identity and continuity within the family, while also adapting to changing times through succession planning and intentional efforts to involve younger members in the legacy-building process. In the process, a father would determine what, when, and how to transfer his property, assets, or a portion of the estate to each child. The literature on strategic bequest motives has examined the issue using a game-theoretic approach within a one-to-one trade framework. For example, studies such as Bernheim et al. (1985) and Perozek (1998) have considered the strategic interplay across generations. The literature suggests that parents provide goods and services to their children based on the expected level of care they will receive from their children in their later years. Some related empirical evidence has found a correlation between the amount of bequest and the level of care provided by their children.[33]

Among some resource-allocating strategies, we examine how the different qualities of children per generation interact with a family's dynastic benefit. To anticipate varying returns from their

sons across generations, families may strategize the allocation of total resources. Such strategic allocation is often based on the anticipated returns from investing in the rearing of a particular child. Particularly, it is a well-known finding from data on patriarchal societies that a son would receive more resources than a daughter, whose social standing is tied to her husband's. The individual attainment of either a son or son-in-law (high $c_{son}$) contributes to lifting a family's collective rank attainments in the future, realized by a nonnegative increase in $U(c_{son}, c_{father})$ at the margin. Recent literature on Asian societies suggests that the eldest son is often delegated greater responsibility in managing the family's assets compared to his younger siblings. This increased responsibility often necessitated larger benefits or inheritance from the former generation.[34]

Specifically, to analyze the firstborn's role in association with dynastic utility, we extend the dynastic utility model in equation (1) to the model of multiple sons such that:

$$\begin{aligned} &U(c_{son}, c_{father}), \\ &where\ c_{son} = \{c_{1st\ son}, c_{2nd\ son}, \ldots, c_{nth\ son}\}\ and\ c_{father} = \{c_{father}, c_{1st\ uncle}, \ldots, c_{(n-1)th\ uncle}\} \\ &subject\ to \sum_i a_i c_i + a_f c_f \geq \sum_i p_i c_i \end{aligned} \tag{2}$$

In equation (2), each sibling's office rank is distinguished and implies different marginal contributions to the family's utility. To maintain consistency in modeling multiple children per generation, we include uncles' office ranks in the old generation. In the last line of equation (2), we introduce a family's resource constraint that each son's stipend $a_i c_i$ dependent on his official grade with $a_i > 0$ and his father's $a_f c_f$ should be greater than or equal to the total costs of raising sons $\sum_i p_i c_i$ (marginal cost per kid, $p_i$). If a greater bequest is provided to the firstborn son, his social achievements may likely be higher than those of his siblings. On the other hand, in some societies, parents are concerned about earnings inequality among their offspring and allocate more(less) resources to the less(more) able.[35] Inheritance is often used to compensate for earnings or capital differences between siblings, serving to mitigate the risks associated with relying on a single heir who receives all the resources. It is especially important to avoid concentrating resources on one offspring's success when expecting high mortality rates or adverse sociopolitical shocks.

$$L = \max_{c_1, c_2, c_f} \{(U_{s1},\ U_{s2},\ U_f) + \lambda\ (a_1 c_1 + a_2 c_2 + a_f c_f - p_1 c_1 - p_2 c_2 - c_f)\} \tag{3}$$

The utility maximization problem subject to the total resource constraint given in equation (2) can be solved by taking the first order conditions of the Lagrangian (Mankiw, 2017). We describe an exemplary Lagrangian of maximizing the utility of a family with a father and two sons in equation (3). To obtain the first order conditions, we take the first differentiation respect to each one's official grade $c_1$, $c_2$, *and* $c_f$, we find the following conditions:

$$\frac{U_i}{U_f} = \frac{a_i - p_i}{a_f}\ for\ i = 1\ and\ 2, \tag{4}$$

where $U_k$ indicates the marginal gain in dynastic utility by a unit increase in $c_k$ for $k = 1,\ 2,\ and\ f$. From equation (4), we find that a son's marginal utility $U_i$ increases with an increase with his stipend gain $a_i$ or a decrease in costs of obtaining the rank $p_i$. Given $a_i > p_i$ for all $i$, it is important to understand that sufficiently large $a_i - p_i$ would contribute to the large increase in the dynastic utility given the fixed $U_f$. To understand which direction of resource allocation was efficient over the intergenerational link, it is necessary to investigate both multiple links at the micro-level and the historical paths of each family's dynastic utility. For example, some families' assets—which started with

similar resource amounts—would grow faster and larger than others. Since the growth rate is contingent on how a family allocates limited resources as expressed in equation (4), it is critical to find the significant resource allocation style in promoting a family's long-term legacy at a micro-level.

Our data set is relevant to investigating the strategic allocation of family resources from both macro and micro perspectives. More specifically, it includes individual government office attainment data for multiple similar families during a relatively politically stable period of the premodern era. We analyze which son's contribution, among $\frac{U_1}{U_f}$ and $\frac{U_2}{U_f}$, is higher for their family(dynasty)-level utility by investigating official ranks of different sons and sons-in-law. Additionally, we compare such marginal gains between two types of elite families: a family with long-term legacy and a family with short reputation. We also investigate data to find if a family was active in investing in heightening a son's rank by using a time dummy for all families: a period of the family's prestige officially referred to one's rank and a period without it. In the following section, we outline our empirical model, which serves as a reduced form representation of the theoretical background. The findings regarding the "first-son effect" will then provide insights into the strategic allocation of family resources.

## Regression Model

To investigate the implications of strategic resource allocation among siblings, we propose a regression model based on the linear relationship of a son's government office rank in increasing his family's dynastic utility equation (4). An individual's attainment is influenced by various factors, from natural intelligence to cultivated personality traits; therefore, our analysis will focus on the average marginal effect of birth order on the probability of rank attainment after controlling some demographic factors.

The data are multinomial distributed by different possible outcomes of rank attainment. Among different multinomial models from maximum likelihood to moment-based estimation, we use the simplest multinomial model—the conditional logit model—to consider how an individual's rank arises from an individual's achievements. The realized rank value is mutually exclusive as it is measured by the rank of an individual's final government office. We apply multinomial logistic regressions to treat the rank has unordered categories, while ordinal logistic regression is used when the categories have a natural order or ranking. In other words, we treat ranks as different specifications of random components, because net gains from ranks in equation (4) are not clearly ordered, leading to different rank probabilities. Our multinomial logit model is:

$$p_{i,k} = \Pr[c_i = k] = \frac{\exp(\beta_{0,k} + \beta_{1,k}x_{1,i} + \beta_{2,k}x_{1,i} * Gen4_k + \beta_{3,k}x_{2,i} + \beta_{4,k}c_{father,i})}{1 + \sum_{j=0}^{K-1} \exp(\beta_{0,j} + \beta_{1,j}x_{1,j} + \beta_{2,j}x_{1,j} * Gen4_j + \beta_{3,j}x_{2,j} + \beta_{4,j}c_{father,j})}$$
$$for\ 0 \le k \le K \tag{5}$$

where $c_i$ is an individual $i$ 's grade level to be specified at $k = 0, \ldots, 3$. On the left-hand side of equation (5), the probability of an individual $i$'s attained rank to be $k$ is denoted by $p_{i,k}$. By considering the time and promotion chances associated with each rank we assume that the realized probability $p_{i,k}$ falls into three categories: none ($k = 0$), low ($k = 1$), middle ($k = 2$), and high ($k = 3$). To explain the probability of achieving a particular rank $p_{i,k} = Pr[c_i = k]$, we consider a few notable independent variables: his birth order $x_{1,i}$, his gender $x_{2,i} = 1$ if he is a son and $x_{2,i} = 0$ if he is a son-in-law (representing a daughter), and his father's rank $c_{father,i}$. Since one's birth order is correlated with the number of siblings, we consider roles of different measures in an extended model, which will be introduced later. We examine the marginal roles of variables from their

coefficients' estimates in determining $\hat{p}_{i,k}$ for $k = 0,\ldots,3$. In this model, we assume that a mutually exclusive rank is preferred over each alternative according to his maximization of dynastic utility with his family's limited resources and the average of his siblings' ($c_{f=i}$) and uncles' ($c_{uncle,i}$) attained ranks.

The weighted sum of explanatory variables, or $\beta_{0,k} + \beta_{1,k}x_{1,i} + \beta_{2,k}x_{1,i} * Gen4_k + \beta_{3,k}x_{2,i} + \beta_{4,k}c_{father,i}$ in equation (5), is a component of his dynastic utility function, implying its high correlation with $U(c_{son}, c_{father})$ from equation (2). Furthermore, we control the similar nurturing environment and genetic information within a family by using maximum likelihood estimation. To ensure accurate estimation of standard errors, we used the robust variance-covariance matrix since observations were not independent, given that they were within families. The robust variance-covariance matrix accounted for clustering observations within families and minimized the risk of underestimating standard errors. By controlling for the family effect, the estimated coefficients are expected to show the marginal effect of each variable, after adjusting the different biological features and nurturing styles to a similar level. Since the model only counts the expected part, some idiosyncratic errors $\epsilon_i$ may exist as independent and identically distributed variables with mean zero and positive variance $\sigma^2$.

From the results, we focus on the sign and size of $\beta_{1,k}$. If a family's limited resources are tilted toward older offspring, $\beta_{1,k}$ would be negative, whereas $\beta_{1,k} > 0$ if it is concentrated on raising younger siblings. If resources are evenly distributed, $\beta_{1,k}$ would remain insignificant to reject the hypothesis that $\beta_{1,k} = 0$. Furthermore, we expect $\beta_{1,k}$ to be influenced by the number of siblings, as families with only one child may be able to concentrate their resources more easily than families with multiple children. Another intergenerational link is shown by $\beta_{4,k}$. If $\beta_{4,k}$ is statistically significant, it would imply something more than just a strong correlation between a son's and his father's rank attainments. This is because a father could potentially appoint his son to an office position if he held high respect within the bureaucracy. We will discuss details about the bureaucratic system in the results section.

In the results section that follows, various models are proposed for verifying marginal effects consistently across different individuals. For example, we transform $x_{1,i}$ into a dummy variable $d_{1,i}$ that takes 1 if ego is the firstborn, and 0 otherwise. We also use the interaction term $d_{1,i} \times m_i$, where $d_{1,i} \times m_i = 1$ if he is the first child, $d_{1,i} = 1$, and male $m_i = 1$. This interaction term helps us distinguish the firstborn son from the first son-in-law. Furthermore, we ran the same regression model (5) by using different subgroups: the first-son group, the only-child group, and the group of sons who were not firstborn. From our examination of results throughout different groups and models, we detect whether the first-child effect is consistently verified.

## Results

In this section, we summarize results from estimation of equation (5) and discuss their implications in finding the statistical evidence for the first-child effect. We also examine the clan-level success, compiled by attained ranks of all generations over the entire sample period. Finally, we discuss the robustness of the findings from empirical analysis by presenting results from a subsample analysis and case studies of a few selected clans.

### *Who Benefited Most from a Father's Political Resources?*

Regression results of applied models based on equation (5) are summarized in Table 2. First, each model reports the marginal role of each variable in increasing the probability of attaining high, middle, and low government office ranks, respectively, relative to zero rank.

**Table 2.** Baseline Ordinal Logit Models of Ego's Grade with Generation Dummy.

| | Model 1 | | | Model 2 | | | Model 3 | | | Model 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Variables | High | Middle | Low | High | Middle | Low | High | Middle | Low | High | Middle | Low |
| Constant ($\beta_0$) | −16.01*** | −2.603*** | 1.799 | −16.90*** | −3.004*** | 1.049 | −18.55*** | −4.502** | −0.51 | −15.16*** | −2.721** | 1.437 |
| | [2.319] | [0.679] | [1.196] | [2.455] | [0.971] | [1.267] | [2.939] | [0.950] | [1.345] | [1.930] | [0.816] | [1.160] |
| ln(birth order) ($\beta_1$) | −0.815*** | −0.582*** | −0.659*** | | | | | | | | | |
| | [0.0264] | [0.255] | [0.0622] | | | | | | | | | |
| ln(birth order) × Gen 4 ($\beta_2$) | 0.0472 | 0.157 | 0.444*** | | | | | | | | | |
| | [0.0626] | [0.273] | [0.0953] | | | | | | | | | |
| Firstborn dummy ($\beta_1^{\dagger}$) | | | | 1.754*** | 0.770*** | 0.976*** | | | | | | |
| | | | | [0.256] | [0.288] | [0.734] | | | | | | |
| Firstborn dummy × Gen 4 ($\beta_2^{\dagger}$) | | | | −0.672*** | −0.282 | −0.709*** | −0.648*** | −0.418*** | −1.075*** | | | |
| | | | | [0.256] | [0.288] | [0.734] | [0.130] | [0.0696] | [0.240] | | | |
| Son dummy ($\beta_2$) | 1.602*** | 2.570*** | 2.490*** | 1.565*** | 2.553*** | 2.491*** | | | | 1.449** | 2.536*** | 2.484*** |
| | [0.607] | [0.462] | [0.578] | [0.621] | [0.463] | [0.579] | | | | [0.574] | [0.454] | [0.575] |
| ln(father's rank) ($\beta_3$) | 14.16*** | 0.0288 | −5.334*** | 13.65*** | −0.426 | −5.582*** | 16.33*** | 2.836** | −2.433* | 12.53*** | −0.659* | −5.756*** |
| | [1.708] | [0.444] | [0.923] | [1.770] | [0.443] | [0.945] | [2.667] | [0.776] | [1.362] | [1.437] | [0.369] | [0.882] |
| Gen 4 | −0.341*** | 0.166 | 0.376* | 0.0347 | 0.471*** | 1.074*** | 0.0302 | 0.613*** | 1.325*** | −0.203*** | 0.494*** | 0.900*** |
| | [0.127] | [0.266] | [0.157] | [0.143] | [0.0945] | [0.121] | [0.0774] | [0.0983] | [0.233] | [0.0543] | [0.0751] | [0.127] |
| Firstborn × Son | | | | | | | 2.752*** | 1.974*** | 2.441*** | | | |
| | | | | | | | [0.211] | [0.180] | [0.0727] | | | |
| Second-born dummy | | | | | | | | | | 0.0278 | 0.713*** | 0.178** |
| | | | | | | | | | | [0.164] | [0.147] | [.0722] |
| Second-born dummy × Gen 4 | | | | | | | | | | 0.276** | −0.417*** | −0.0586 |
| | | | | | | | | | | [0.134] | [0.160] | [0.112] |
| Number of observations | 3381 | | | 3381 | | | 3381 | | | 3381 | | |

*Note.* Robust errors in brackets.
***$p < .01$, **$p < .05$, *$p < .0$.

In Model 1, we find the negative effect of an individual's birth order in explaining an individual's rank attainment. More specifically, we find that a younger son tends to have a much lower probability of reaching a high rank (−0.815), and that tendency is smaller than his attainment of the middle (−0.582) or low (−0.659) levels. According to the results, a father's rank attainment seems to have a strong correlation with the rank of his son or son-in-law, particularly if the father is a highly respected official. This strong relationship is neither significant among those sons in the middle nor positive among them at the low level. However, a son still has a higher chance of entering government office than a son-in-law does on average, and the highest chance is found among those ranked at the middle level.

Additionally, we find several variables play significant roles in Model 2 and the following models. In Model 2, we use a "Firstborn" dummy variable to test the firstborn advantage. To determine if the firstborn advantage is specific to the first son, we include a "Son" dummy with the "Firstborn" dummy in Model 3. In Model 2, we find a positive coefficient for the "Firstborn" dummy variable, with the highest value in the high-level group, followed by smaller values in the middle and low-level groups. Specifically, the coefficients for the "Firstborn x Son" dummy across all groups are consistent with the "Firstborn" dummy in Model 2. In Model 4, in addition to contrasting firstborn individuals (coded as Firstborn dummy = 1) with non-firstborn individuals (coded as Firstborn dummy = 0), we also estimate the coefficient for the "Second-born" dummy variable, which reveals a distinct pattern: second-born children are more likely to achieve middle-level ranks.

The results in Table 2 indicate that firstborn sons have a significantly higher probability of attaining a high rank compared to their younger siblings. This finding is consistent with the larger number of firstborn sons among those in high-level positions, compared to sons born later in birth order. This is a noteworthy result, as it is observed even after controlling for the shared nurturing environment and similar genetic characteristics within a family. Furthermore, the data from four families reveal similar patterns regarding the first-son effect, which implies that family resources tend to be concentrated on the firstborn son. Given the first-son effect, the strong correlation between a father with high rank attainment and a son with high rank attainment is likely to be explained by this direct father-to-firstborn son connection, rather than a more general intergenerational transmission of status.

## *Can the Firstborn Advantage Persist?*

The robustness of the birth-order effect is examined by checking the significance of the $Gen4_k$ 's role in its relationship with the Firstborn dummy. Particularly, $Gen4_k$ allows us to identify the family's willingness to support the first-born, since it is a dummy variable to take 0 for those born beyond four generations from a progenitor ($Gen4_k = 0$) whereas it becomes 1 for those were born immediate (within $4^{th}$ generations) from a progenitor ($Gen4_k = 1$). The significance of the "Gen 4 dummy variable" remains consistent across Model 1 through Model 4. The "Gen 4 dummy variable" is a key to testing the strength of the concentration strategy, because it switches on (indicates a value of 1) when family background has limited influence on one's probability of starting or expanding their career due to the civil examination *gwageo*. If the firstborn does not stand out from others when the "Gen 4" is switched on, his advantage is more likely the result of a family's active involvement rather than his biological or personal qualities. Furthermore, the coefficients associated with the "Firstborn dummy × Gen 4" interaction term show that the first son's effect decreases significantly. It implies that the civil examination was effective in limiting a family's influence on heightening the firstborn's rank. From the interaction term's coefficient for individuals with low rank, we find that the birth-order effect is 0.444.

To understand the historical context of the firstborn advantage within a large-family culture, we need to analyze it from a wider scope, looking beyond just the immediate generations. We introduce two models in equation (6) considering the potential effects of the number of uncles and cousins, such that:

$$p_{i,k} = \Pr[c_i = k] = \frac{\exp(\beta_{0,k} + \beta_{1,k}x_{1,i} + \beta_{2,k}x_{1,i} * Gen4_k + \beta_{3,k}x_{2,i} + \beta_{4,k}c_{father,i} + \beta_{5,k}\bar{c}_{m\neq i} + \beta_{6,k}\bar{c}_{uncle,i} + Z_i\gamma_k)}{1 + \sum_{j=0}^{K-1}\exp(\beta_{0,j} + \beta_{1,j}x_{1,j} + \beta_{2,j}x_{1,j} * Gen4_j + \beta_{3,j}x_{2,j} + \beta_{4,j}c_{father,j} + \beta_{5,j}\bar{c}_{m\neq j} + \beta_{6,j}\bar{c}_{uncle,j} + Z_j\gamma_k)}$$

$$for\ 0 \leq k \leq K \tag{5}$$

where the average of siblings' attained ranks $\bar{c}_{m \neq i}$ is considered to examine the overall family-level effect across siblings. We add the average and standard deviation of uncles' grades $\bar{c}_{uncle,i}$ except the ego and ego's father. Other variables, if they are included, are summarized in a variable vector $Z_k$ and their effects are denoted by $\gamma_k$. We also consider a father's information including his birth order and attained rank, a grandfather's rank, and the number of siblings. The number of siblings helps us distinguish the first-son effect from potential differences in the quality and quantity of parental investment across family sizes. Additionally, we include the standard deviation of siblings' ranks as a variable. If the coefficient of this variable is positive, it would suggest that a family's highly ranked firstborn son is correlated with large differences in the ranks of their other children. Such a large disparity is often indicative of considerable numbers of siblings occupying low-level positions. From the results, we would see whether families tend to concentrate on their resources specifically for the sake of their firstborn son.

From the results in Table 3, we find that the coefficients for birth order (Model A1) and the firstborn dummy (Model A2) have the same implications as those in Table 2. The negative effect of a father's birth order suggests that a firstborn father is highly likely to attain higher ranks than uncles born afterward. Particularly, the first-child effect, whether the negative coefficient of birth order (Model A1) or the positive coefficient of the firstborn dummy (Model A2), was larger among those who were born within the first four generations, when their parents could take more active and direct political actions to influence their offspring's government positions. However, the firstborn effect remains consistent to a lesser degree among those born after the fourth generation.

We find statistical evidence that the first-son effect is partially supported by the concentration of family resources. This is evident from the negative effect of the number of siblings, as well as the positive effects of the standard deviations in the attained ranks of both uncles and siblings. Parents can make greater investments in one son compared to others in a large family to help that son reach a high-ranking position. Additionally, the positive and significant effect of the standard deviation suggests that the status of this favored son is well-distinguished from that of other sons. On the other hand, the coefficient of the average attained ranks of uncles and siblings indicates that middle-ranked sons can actively benefit from the high average of their siblings' and uncles' ranks in their own promotions to the middle level.

## Robustness Checks

In this section, we summarize the results of estimating equation (3) with subsets of the entire sample and summarize them in Table 4. Since we examined the marginal effects of the explanatory variables within specific subgroups, the models in Table 4 are noted as "conditional models." The first model uses data from only individuals who were firstborn, and the second presents results for only-child families. The results for the "firstborn only" group are comparable to those for the

**Table 3.** Applied Ordinal Logit Models of Ego's Government Office Rank.

| | Model (A1) | | | Model (A2) | | |
|---|---|---|---|---|---|---|
| Variables | High | Middle | Low | High | Middle | Low |
| Constant | −16.47*** | −3.166*** | 0.622 | −18.75*** | −4.502*** | −0.957 |
| | [2.458] | [0.406] | [1.223] | [2.509] | [0.630] | [1.241] |
| Gen 4 dummy | −1.617*** | −1.263*** | −0.950*** | −0.542** | −0.581*** | 0.129 |
| | [0.131] | [0.307] | [0.077] | [0.252] | [0.029] | [0.081] |
| ln(birth order) | −1.173*** | −0.510*** | −0.657*** | | | |
| | [0.074] | [0.273] | [0.030] | | | |
| ln(birth order) × Gen 4 | 0.434*** | 0.279 | 0.576*** | | | |
| | [0.125] | [0.271] | [0.099] | | | |
| Firstborn dummy | | | | 2.666*** | 1.420*** | 1.604*** |
| | | | | [0.109] | [0.174] | [0.081] |
| Firstborn dummy × Gen 4 | | | | −1.245*** | −0.672*** | −1.068*** |
| | | | | [0.251] | [0.111] | [0.125] |
| Son dummy | 0.406 | 0.844*** | 0.778*** | 0.5 | 0.859*** | 0.793*** |
| | [0.341] | [0.229] | [0.196] | [0.358] | [0.245] | [0.212] |
| ln(father's birth order) | −1.107*** | −0.877*** | −0.571*** | −1.007*** | −0.820*** | −0.516*** |
| | [0.189] | [0.140] | [0.127] | [0.184] | [0.130] | [0.117] |
| ln(father's attained rank) | 15.58*** | 1.407* | −3.097** | 15.45*** | 1.453* | −3.013*** |
| | [2.303] | [0.821] | [1.140] | [2.300] | [0.825] | [1.097] |
| ln(number of siblings) | −0.837*** | −1.060*** | −0.736*** | −0.879*** | −0.940*** | −0.589*** |
| | [0.186] | [0.139] | [0.124] | [0.132] | [0.084] | [0.130] |
| Uncles' attained ranks, | 1.148*** | 1.317*** | 1.213*** | 1.091*** | 1.272*** | 1.172*** |
| *Average* | [0.048] | [0.065] | [0.073] | [0.052] | [0.069] | [0.081] |
| Uncles' attained ranks, | 0.992*** | 0.816*** | 0.284 | 1.008*** | 0.850*** | 0.32 |
| *Standard deviation* | [0.251] | [0.139] | [0.260] | [0.255] | [0.152] | [0.262] |
| Siblings' attained ranks, | 1.455*** | 1.759*** | 1.446*** | 1.567*** | 1.777*** | 1.453*** |
| *Average* | [0.092] | [0.092] | [0.091] | [0.077] | [0.082] | [0.080] |
| Siblings' attained ranks, | 1.510*** | 0.680*** | 0.782*** | 1.571*** | 0.668** | 0.760** |
| *Standard deviation* | [0.154] | [0.282] | [0.385] | [0.121] | [0.261] | [0.366] |
| Observations | 3,381 | | | 3,381 | | |

*Note.* Robust errors in brackets.
***$p < .01$, **$p < .05$, *$p < .01$.

**Table 4.** Conditional Ordinal Logit of Ego's Government Office Rank.

| Variables | Firstborn only | | | Only-child family | | | Non-firstborn | | |
|---|---|---|---|---|---|---|---|---|---|
| | High | Middle | Low | High | Middle | Low | High | Middle | Low |
| Constant | −21.89*** | −13.89*** | −18.85** | −12.11*** | −26.66*** | −17.28*** | −45.30*** | −20.06*** | −15.37** |
| | [1.566] | [5.027] | [4.376] | [2.141] | [1.749] | [1.552] | [4.327] | [2.878] | [6.190] |
| Gen 4 dummy | −1.898*** | −1.642*** | 11.76*** | −3.761*** | −1.451*** | 11.34*** | 0.284 | −0.419* | −0.055 |
| | [0.166] | [0.277] | [1.375] | [0.304] | [0.211] | [1.303] | [0.273] | [0.224] | [0.280] |
| ln(father's attained rank) | 22.08*** | 0.196 | −0.989 | 17.62*** | 3.121*** | −3.135*** | 32.77*** | 6.739*** | −0.845 |
| | [1.557] | [0.592] | [1.298] | [2.766] | [1.067] | [0.611] | [3.108] | [0.454] | [1.276] |
| ln(number of siblings) | −1.398*** | −1.342*** | −0.824*** | | | | −1.102*** | −1.211*** | −0.649*** |
| | [0.150] | [0.153] | [0.203] | | | | [0.116] | [0.278] | [0.253] |
| Uncles' attained rank, | 0.704*** | 0.962*** | 0.948*** | 1.025*** | 1.278*** | 1.197*** | 1.364*** | 1.613*** | 1.503*** |
| *Average* | [0.043] | [0.124] | [0.098] | [0.162] | [0.161] | [0.194] | [0.127] | [0.082] | [0.139] |
| Uncles' attained rank, | 0.365 | 0.443 | −0.803* | −0.369*** | −0.352 | −2.193*** | 0.613* | 0.543 | −0.115* |
| *Standard deviation* | [0.543] | [0.365] | [0.422] | [0.133] | [0.396] | [0.423] | [0.323] | [0.476] | [0.069] |
| Siblings' attained rank | 1.440*** | 1.610** | 1.169*** | | | | 2.958*** | 2.759*** | 2.306** |
| *Average* | [0.170] | [0.137] | [0.089] | | | | [0.210] | [0.265] | [0.064] |
| Siblings' attained rank, | 0.565 | −0.786* | −0.264 | | | | 0.27 | −0.566 | −0.945*** |
| *Standard deviation* | [0.446] | [0.465] | [0.231] | | | | [0.170] | [0.471] | [0.342] |
| ln(grandfather's rank) | 0.173 | 12.63*** | 5.824* | −3.085*** | 21.49*** | 6.632*** | 5.407*** | 8.785** | 11.06** |
| | [0.435] | [4.203] | [3.060] | [0.582] | [1.227] | [1.314] | [1.361] | [2.887] | [4.918] |
| Number of observations | 491 | | | 171 | | | 1,513 | | |

*Note.* Robust errors in brackets.
***$p < .01$, **$p < .05$, *$p < .0$.

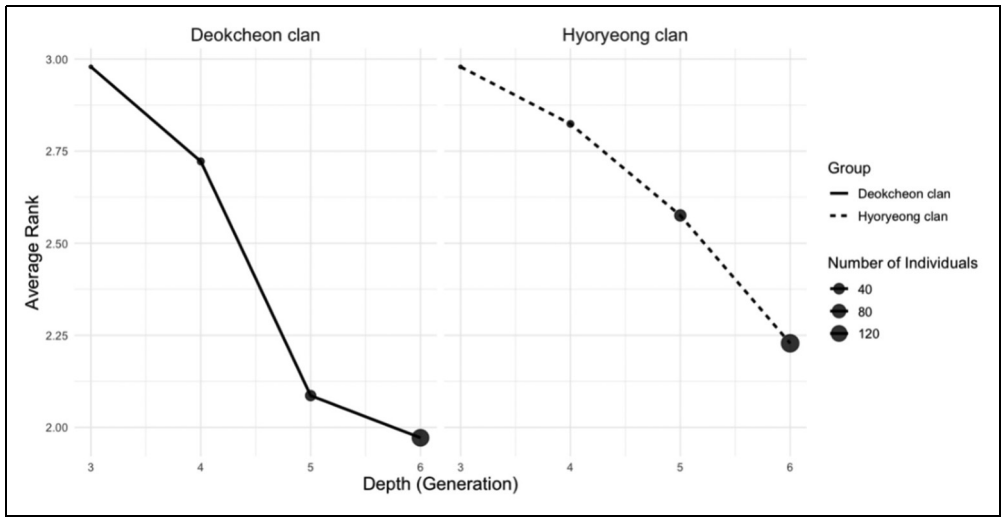


**Figure 4.** Depth-wise Average Rank per Group.

"non-firstborn" samples, which are summarized in the last section of Table 4. Throughout these three models, we excluded two variables: ego's birth order and the first-son dummy variable, focusing instead on interpreting different marginal effects based on ego's birth order information in each sample.

The coefficients exhibit patterns similar to those observed in the entire sample model (compiled in Table 3). Among the explanatory variables in the "firstborn" model, we find the largest effect (22.08) of a father's official rank. The effect decreases for those in the middle and lower ranks. These patterns of the effects from a father's attained rank are consistently found among "only-child" and "non-firstborn" egos. If a highly ranked father can provide more political and social resources to his son, this high rank implies a higher probability that his son will also achieve a high rank. Furthermore, such investment appears to be more strongly related to a firstborn son at a high rank than to a firstborn son at a middle to low rank.

However, the negative coefficients of the "Gen 4 dummy" variable in the high and middle-ranked groups suggest that active intervention was primarily focused on promoting the firstborn son. This result contrasts with the positive effect of the "Gen 4 dummy" observed among the low-ranked group. Additionally, the last model using the "non-firstborn" subsample shows a significant negative effect only for the middle-ranked group, and to a lesser degree. This finding suggests that the political success of the firstborn is more likely the result of a family's dedicated efforts, rather than the firstborn's inherent qualities.

## *Birth Order and Political Success in the Joseon Dynasty: A Case Study of Powerful Clans*

To further investigate the "firstborn advantage" observed in our statistical analysis, we conducted a case study of two influential military clans of the Joseon dynasty: the Deokcheon and Hyoryeong clans. These clans were chosen based on their prominence within the royal genealogy and their historical significance in producing a substantial number of *Saengwon* and *Jinsa* scholars. The genealogical data used for this case study include 257 individuals from the Deokcheon clan and 309 individuals from the Hyoryeong clan, both of which represent powerful branches within the Joseon royal family.[36]

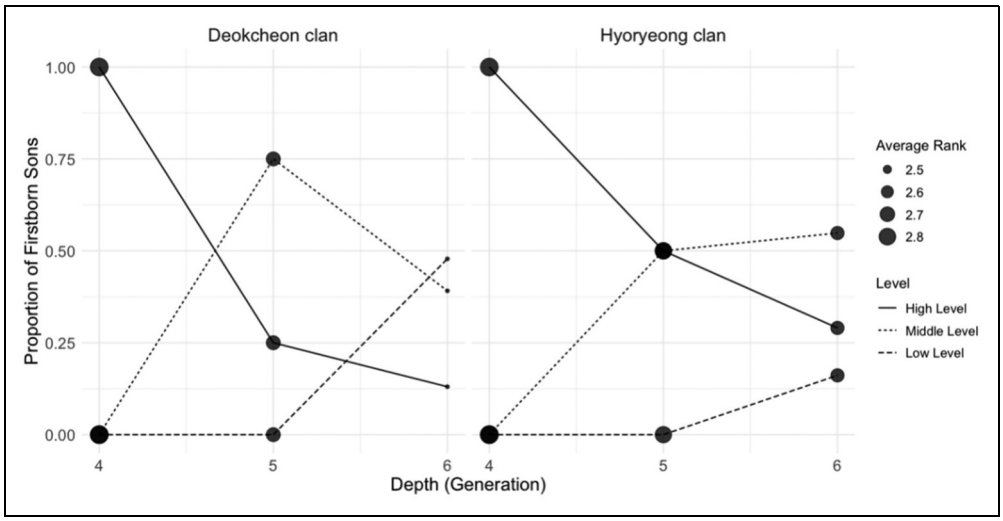


**Figure 5.** Proportion of Firstborn by Level and Depth.

Using the extracted individual data for each clan, we first visualized the number of members included in each generation (depth) of the clan and their average attained ranks, as shown in Figure 4. In Figure 4, higher values on the *y*-axis indicate that the average rank of officials within each clan is higher. As observed in Figure 4, both clans demonstrate a trend where the ego (*sijo*) achieved high government ranks. However, as generations progress, the number of individuals included in the clans increases, while the average rank per generation declines. Notably, the decline in average rank becomes more pronounced after the fourth generation, coinciding with the period when the *gwageo* (civil service examination) became a dominant pathway for career advancement. This suggests that individuals from later generations faced greater meritocratic competition compared to their predecessors, who benefited from lineage-based appointments.

Next, to examine whether this trend is linked to the rank attainment of firstborns, we extracted firstborn individuals for each clan and visualized, as shown in Figure 5, the proportion of firstborns included in each rank level across generations. Unlike Figure 4, Figure 5 starts from the fourth generation, as the Deokcheon clan's ego (*sijo*; Yi Hu-Saeng) was the tenth child, and the Hyoryeong clan's ego (*sijo*; Yi Bo) was the third child. As a result, the third generation, corresponding to the ego (*sijo*), was omitted when creating the graph focused on firstborns.

From Figure 5, it is evident that the proportion of firstborns occupying high-ranking government positions declines significantly after the fourth generation. While firstborns initially dominated high-level positions, this trend reverses in later generations, with an increasing share of firstborns entering middle or lower-level positions. This shift suggests that, as elite family privileges diminished over time, birth order alone was no longer sufficient to secure high-ranking bureaucratic positions, reinforcing the increasing role of competitive examination-based selection.

Synthesizing the observations from Figures 4 and 5, the overall decline in the average official grades of both clans across generations can likely be attributed to the decreasing proportion of firstborns occupying key positions in higher-rank groups. This pattern reflects a broader societal transformation in Joseon Korea, where the influence of hereditary advantages weakened, and merit-based selection mechanisms increasingly gained prominence.

The prioritization of firstborns in Joseon Korea can be understood within the hierarchical sociopolitical structure, where families concentrated resources on firstborns to secure prestigious

bureaucratic positions and maintain their influence. This strategic focus on firstborns is evident in both historical data and the broader literature on patriarchal societies, emphasizing its role in sustaining family wealth and status. A case study of the Deokcheon and Hyoryeong clans confirms that after the fourth generation, the effectiveness of this strategy diminished, with birth order no longer guaranteeing elite status. These findings align with our statistical analysis on the first-child effect that remains consistent for those who were born later than the fourth generation, illustrating how resource allocation to firstborns significantly influenced the hierarchical dynamics of premodern Korean society.

## Conclusion

This study highlights the significant role of birth order in determining resource distribution and political advancement within the Joseon royal family. It examines how these practices evolved under the influence of Neo-Confucian governance, marking a shift from earlier egalitarian traditions to a system that increasingly prioritized firstborn son. While sharing similarities with European primogeniture and Chinese patrilineal hierarchies, the Joseon system stands out for its distinctive approach to carefully balancing hierarchical priorities with familial responsibilities.

This study contributes to the understanding of inheritance practices and elite strategies in several ways. From our data of royal families, the firstborn primacy realized through the consistently significant effect of a first-child dummy on one's official ranking. However, it shows how royal families actively reshaped institutions, such as the *gwageo* examinations, to maintain dynastic stability. The smaller first-child effect among those who were born without direct parents' influence is suggestive evidence on the active role of the *gwageo* as a great equalizer. It also highlights the tension between the meritocratic ideals that were integral to such institutions and the hierarchical realities of privilege based on birth order. By analyzing these dynamics, the study offers insights into the strategies employed by royal family members, particularly those from more distant branches, to navigate and survive within the power structure.

On a broader level, this study enriches discussions of how traditions adapt over time and how elites recalibrate their influence across generations. The findings open avenues for comparative research that examines how birth order and inheritance practices evolved under different cultural, political, and economic circumstances. By placing the Joseon experience in a global context, this research underscores the creative and flexible strategies used by aristocratic families worldwide to maintain their authority and legacy.

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### Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Notes

1. Graziella Bertocchi, "The law of primogeniture and the transition from landed aristocracy to industrial democracy." *Journal of Economic Growth* XI (2006): 43–70; Jack Goody, *The Development of the Family and Marriage in Europe.* Cambridge, 1983; James L. Boone, "Parental investment and elite family structure in preindustrial states: A case study of late medieval-early modern Portuguese genealogies." *American Anthropologist* LXXXVIII (1986): 859–78; Evelyn Cecil, *Primogeniture: A Short History of Its Development in Various Countries and Its Practical Effects.* London, 1895; Andrej Kokkonen et al., *The Politics of Succession: Forging Stable Monarchies in Europe, AD 1000–1800.* Oxford, 2022; Èric Roca Fernández, "Inheritance systems and the dynamics of state capacity in Medieval Europe." *Historical Social Research* XLI (2016): 135–57.
2. Michael Mitterauer and Reinhard Sieder, *The European Family: Patriarch to Partnership from the Middle Ages to the Present.* Blackwell, 1982; H. J. Habakkuk, "Family structure and economic change in nineteenth-century Europe." *The Journal of Economic History* 15.01 (1955): 1–12; J. Goody, J. Thirsk, and E.P. Thompson, *Family and Inheritance: Rural Society in Western Europe, 1200–1800.* Cambridge University Press, 1978; Norman Anderson, *Law Reform in the Muslim World.* University of London Athlone Press, 1976; C. Nakane, *Kinship and Economic Organisation in Rural Japan* (1st ed.). Routledge, 1967; Michiko Suenari, "First child inheritance in Japan." *Ethnology* 11. 2 (1972).
3. Joan Thirsk, "The European debate on customs of inheritance, 1500–1700." In *Family and Inheritance: Rural Society in Western Europe, 1200–1800*, ed. Jack Goody, Joan Thirsk, and E.P. Thompson. Cambridge University Press, 1976, 177–91; Boone, "Parental investment." 859–78; ibid.; Kokkonen et al., *Politics of Succession*; Theodore C. Bergstrom, "Primogeniture, monogamy and reproductive success in a stratified society." *Meeting Papers*, (revised 1994).
4. Antoinette Fauve-Chamoux and Emiko Ochiai, eds., *The Stem Family in Eurasian Perspective: Revisiting House Societies, 17th–20th Centuries.* Peter Lang, 2009, 20–22.
5. Moowon Cho, "The problem of sovereign succession in Confucian ritual discourse." *Korean Studies* XLII (2018): 89–120; Andrew Eisenberg, *Kingship in Early Medieval China.* Leiden, 2008; Susan B. Hanley and Arthur P. Wolf, eds., *Family and Population in East Asian History.* Stanford, 1985; Martina Deuchler, *The Confucian Transformation of Korea: A Study of Society and Ideology.* Harvard University Press, 1992.
6. ibid, 129–36.
7. Joseph E. Stiglitz, "Distribution of income and wealth among individuals." *Econometrica* 37 (1969): 382–97; Alan S. Blinder, "A model of inherited wealth." *Quarterly Journal of Economics* 87 (1973): 608–26; C. Y. Cyrus Chu, "Primogeniture." *Journal of Political Economy* 99 (1991): 78–99.
8. Frederic L. Pryor, "Simulation of the impact of social and economic institutions on the size distribution of income and wealth." *A.E.R.* 63 (1973): 50–72, Eytan Sheshinski, and Yoram Weiss, "Inequality within and between families." *J.P.E.* 90 (1982): 105–27.
9. Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (Reprint). Modern Library, 1937, 362.
10. C. Y. Cyrus Chu, "Primogeniture." *Journal of Political Economy* 99 (1991): 78–99.
11. Charles Horioka, "Are the Japanese selfish, altruistic or dynastic?" *The Japanese Economic Review* 53 (March 2002): 26–54.
12. Jaehoon Cha, "To build a centralizing regime: Yangban aristocracy and medieval Patrimonialism." *Seoul Journal of Korean Studies* XXXII (2019): 21–45; John B. Duncan, *The Origins of the Choson Dynasty.* Seattle, 2000; Sangkuk Lee, "The impacts of birth order and social status on the genealogy register in thirteenth- to fifteenth-century Korea." *Journal of Family History* XXXV (2010): 115–27; ibid.; Deuchler, *Confucian Transformation of Korea*.
13. This study strategically concentrates on royal families to enhance empirical leverage in detecting the primogeniture effect. By utilizing genealogical records from royal lineages, we explicitly aim to isolate

inheritance dynamics specific to firstborn heirs. Nonetheless, we acknowledge that royal families operate under distinct political and resource constraints compared to broader elite groups; hence, caution is necessary when generalizing our findings beyond the royal context.

14. Eunbin Hong et al., "Strengthening the inner circle: The marriage networks of elite families in Joseon Korea." *The History of the Family* XXVI (2021): 313–35; Sangkuk Lee and Wonjae Lee, "Strategizing marriage: A genealogical analysis of Korean marriage networks." *The Journal of Interdisciplinary History* XLVIII (2017): 1–19; Sangkuk Lee and Jong Hee Park, "Quality over quantity: A lineage-survival strategy of elite families in Premodern Korea." *Social Science History* XLIII (2018): 31–61.
15. *Ibid*.; Duncan, *Origins of Choson*.
16. Johncan, *The Origins of the Choson Dynasty.* University of Washington Press, 2000: Martina Deuchler, *The Confucian Transformation of Korea: A Study of Society and Ideology.* Harvard University Press, 1992, 129–36.
17. *Ibid*.; Cha, "Yangban Aristocracy." 21–45; *ibid*.; Deuchler, *Confucian Transformation of Korea*.
18. Chang-ae Won, "The scope of royal relatives in the Joseon genealogical records" [in Korean], *Korean Genealogical Studies* IV (2013): 37–69; *ibid*.; Deuchler, *Confucian Transformation of Korea*.
19. Seongmu Lee, *Jo-seon-jeon-gi-ui sin-bun-je-do* [*Status system in the early Joseon Dynasty*]. Ilchokak, 1976; Yeongwoo Han, *Jo-seon-jeon-gi sa-hoe-gyeong-je-yeon-gu* [*Research of socio-economics in the early Joseon Dynasty*]. Eulyoo Publication, 1991; Junho Song, *Jo-seon-sa-hoe-sa yeon-gu* [*Research of Society in Joseon Dynasty*]. Iljokak, 1987.
20. Miyajima Hiroshi, *Yang-ban.* Gang, 1996, 41–45; Bun Woong Kim, "Confucianism and administrative development interventionism." *Global Economic Review* VI (1977): 99–109; Sugeon Lee, Han-gug-ui gwa-geo-je-do [*Gwageo system of Korea*]. Jipmoondang, 1994; Jonhee Lee, "Yang-ban gwan-lyo-gug-ga-ui teug-seong [Characteristics of yangban bureaucracy]." In *The new edition of Korean History*. National Institute of Korean History, 2004, XXIII, 13–54.
21. *Ibid*.; Cha, "Yangban Aristocracy." 21–45; *ibid*.; Eisenberg, *Kingship in Early Medieval China*; During the Joseon Dynasty, the *yangban* functioned as the dominant elite group, encompassing both civil and military officials who exercised considerable authority over Korea's political, social, and cultural spheres. Firmly grounded in Confucian ideals, these scholar-officials typically secured their positions through the *Gwageo* (civil service examination) system, although heredity also played a key role in maintaining their status. By controlling large tracts of land, holding government posts, and receiving exemptions from taxation and military service, the *yangban* maintained a pronounced hierarchical advantage over the peasantry; *ibid*.; Deuchler, *Confucian Transformation of Korea*; *ibid*.; Lee and Lee, "Strategizing Marriage." 1–19; K. Kim, "Social History of Marriage and Remarriage in 18th Century Korea" [in Korean], *Quarterly Review of Korean History* LI (2004): 195–223.
22. *Ibid*.; Deuchler, *Confucian Transformation of Korea*.
23. *Ibid*.; Eisenberg, *Kingship in Early Medieval China*; *ibid*.; Kokkonen et al., *Politics of Succession*; *ibid*.; Deuchler, *Confucian Transformation of Korea*; *ibid*.; Duncan, *Origins of Choson*; *ibid*.; Lee and Lee, "Strategizing marriage." 1–19.
24. Chang-ae Won, "The scope of royal relatives in the Joseon genealogical records." *Korean Genealogical Studies* IV (2013): 37–69.
25. During the Goryeo period, administrative agencies like *Jongjeongsi* and *Jongbuseo* managed royal genealogies. After the establishment of the Joseon dynasty, King Taejo established *Jeonjungsi* in 1392, which was later renamed *Jongbuseo* and continued until 1864, the first year of King Gojong's reign; The creation of royal genealogies on a national scale occurred during King Taejong's period, resulting in the formation of genealogies such as *Seonwonrok*, *Jongchinrok*, and *Yuburok*. *Seonwonrok* traced the direct line from Taejo's ancestor, King Taejo, to his descendants, while *Jongchinrok* recorded the sons of King Taejo and Queen Sinui. Finally, *Yuburok* included princesses and sons of secondary queens; M-S. Lee, "Utilizing the Seonwongyebogiryak (璿源系譜紀略)

Genealogical Records in Janseogak Library: A Survey of the Current Condition of the Joseon Royal Family Genealogy" [in Korean], *Kookhak* (*The Korean Studies Institute*) XIII (2008): 225–272.

26. Different versions of *Seonwonrok* have existed since the early Joseon period, including forms such as *Seonwonrok*, *Jongchinrok*, *Yuburok*, *Eocheop*, *Palgojodo*, and later, forms like *Seonwongyebogiryak*, *Wangbisebo*, and *Seonwongsokbo*; in the Joseon dynasty, the *Jongchinbu* (Office of Royal Family Affairs) was an institution responsible for managing affairs related to the extended royal family. Its functions included maintaining and regulating genealogical records, overseeing the observance of Confucian rituals among royal kin, and managing issues pertaining to succession and privileges; Chang-ae Won, "Joseonhugi seonwonbocheopryuui pyeonchanchejewageu seonggyeok (The Compiling System and Characters of the Kinds of the Genealogical Documents of Royal Origins during the Late Joseon Period)." [in Korean] *Jangseogak (The Academy of Korean Studies)* XVII (2007): 39–72.
27. *Ibid*.; Hong et al., "Marriage networks of elite families." 313–35; governmental positions in *Goryeo* and *Joseon* are segmented into 18 ranks, where nine *Pum*s (品) are further divided into two levels, *Jeong* (正) and *Jong* (從). Despite this continuous rank system, *Dangsanggwan* (堂上官, *Jeong 1 Pum* to *Jeong 3 Pum*) and *Chamsanggwan* (參上官, *Jong 3 Pum* to *Jong 6 Pum*) are differentiated from the lower-rank offices as the highest elite groups; C. Han, "A study on the state councillors at the early Chosun Dynasty." *Daegu Historical Studies* LXXXVII (2007): 1–31.
28. Gary S. Becker, Robert J. Barro, "A reformulation of the economic theory of fertility." *The Quarterly Journal of Economics* 103.1 (1988): 1–25; R. J. Barro, and G. S. Becker, "Fertility choice in a model of economic growth." *Econometrica* 57.2 (1989): 481–501; George-Levi Gayle, Limore Golan, and Mehmet A. Soytas, "Estimation of dynastic life-cycle discrete choice models." *Quantitative Economics* 9 (2018): 1195–241; Glenn C. Loury, "Intergenerational transfers and the distribution of earnings." *Econometrica, Econometric Society* 49.4 (1981): 843–67.
29. Miles S. Kimball, Daniel Reck, Fudong Zhang, Fumio Ohtake, and Yoshiro Tsutsui, "Diminishing Marginal utility revisited (January 2024)." NBER Working Paper No. w32077, Available at SSRN: https://ssrn.com/abstract=4709131
30. N. Mankiw, "Principles of microeconomics" (2017) Cengage Learning.
31. Yoram Weiss and Chaim Fershtman, "Social status and economic performance: A survey." *European Economic Review*, *Elsevier* 42.3–5 (1998): 801–20; Carmen Camacho, Fatih Harmankaya and Çağrı Sağlam, "Social status pursuit, distribution of bequests and inequality." *Economic Modelling* 86. C (2020): 183–91.
32. Marco Cagetti and Mariacristina De Nardi, "Estate taxation, entrepreneurship, and wealth." *The American Economic Review* XCIX (2009): 85–111; John Laitner. "The definition of stability in models with perfect foresight." *Journal of Economic Theory* 28 (1982): 347–53.
33. B. Douglas Bernheim et al. "The strategic bequest motive." *Journal of Political Economy* CXIII (1985): 1045–76; Maria G. Perozek, "A reexamination of the strategic bequest motive." *Journal of Political Economy* CVI (1998): 423–45; Max Groneck, "Bequests and informal long-term care: Evidence from HRS exit interviews." *The Journal of Human Resources* LII (2017): 531–72; Charles Yuji Horioka et al., "Why do children take care of their elderly parents? Are the Japanese any different?" *International Economic Review* LIX (2018): 113–36.
34. Midori Wakabayashi and Charles Y. Horioka, "Is the eldest son different? The residential choice of siblings in Japan." *Japan and the World Economy* XXI (2009): 337–48; Sidney B. Westley and Minja Kim Choe, "How does son preference affect populations in Asia?." *Asia Pacific Issues* LXXXIV (2007): 1–12; Dahye Kim and Jeremy Lim-Soh, "Between-sibling inequality in inheritances: Intergenerational support and patrilineality in South Korea." *Journal of Marriage and Family* LXXXVI (2023): 30–48.
35. Jere R. Behrman et al., "Parental preferences and provision for progeny." *Journal of Political Economy* XC (1982): 52–73; Mark O. Wilhelm, "Bequest behavior and the effect of heirs' earnings: Testing the altruistic model of bequests." *The American Economic Review* LXXXVI (1996): 874–92.
36. *Ibid*.; Won, "The compiling system and characters." 39–72.

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