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A THEORETICAL COMPARISON OF DEVELOPMENTAL STATE AND ENTREPRENEURIAL STATE: CATCH UP OR TECHNOLOGICAL ADVANCEMENT[1]

KALKINMACI DEVLET İLE GİRİŞİMCİ DEVLETİN TEORİK BİR KARŞILAŞTIRMASI: YAKINSAMA VEYA TEKNOLOJİK İLERLEME

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Abstract

This paper presents a critical comparison of the developmental state and the entrepreneurial state, contributing to the existing literature by highlighting the advantages and necessity of an entrepreneurial state over a developmental state through the connection between public institutions and spinoffs. The article discusses how the state's technology research has led to the creation of new and dynamic sectors, increasing growth and employment, as well as encouraging the private sector to increase its R&D investments to establish more innovative companies, using the example of the United States while comparing Asian and European countries. In this context, it is hypothesized that an entrepreneurial state is more efficient and superior compared to a developmental state. The study supports this hypothesis by mentioning how China combines the entrepreneurial state model with the developmental state model. Subsequently, the concepts of the entrepreneurial state and developmental state are defined concerning technology, innovation, and competition. In the final section, a comparison is made between the entrepreneurial state and the developmental state, demonstrating that theoretically, the entrepreneurial state is essential and offers numerous advantages over the developmental state.

Keywords: Growth, Innovation, Technology, Entrepreneurial State, Developmental State

Öz

Bu makale, kalkınmacı devlet ile girişimci devletin eleştirel bir karşılaştırmasını sunmakta ve kamu kurumları ile çıktıları arasındaki bağlantı yoluyla girişimci bir devletin kalkınmacı bir devlete göre avantajlarını ve gerekliliğini vurgulayarak mevcut literatüre katkıda bulunmaktadır. Makalede, devletin teknoloji araştırmalarının nasıl yeni ve dinamik sektörlerin oluşmasını, büyümenin ve istihdamın artmasını sağladığı, ayrıca özel sektörü daha yenilikçi şirketler kurmak için Ar-Ge yatırımlarını artırmaya teşvik ettiği ABD örneğinde ele alınıyor. Asya ve Avrupa ülkelerinin karşılaştırılarak, bu bağlamda girişimci bir devletin, kalkınmacı bir devlete göre daha verimli ve üstün olduğu hipotezi ileri sürülmektedir. Çalışma, Çin'in girişimci devlet modelini kalkınmacı devlet modeliyle nasıl birleştirdiğine değinerek bu hipotezi desteklemektedir. Daha sonra girişimci devlet ve kalkınmacı devlet kavramları teknoloji, yenilik ve rekabetle ilişkilendirilerek tanımlanmaktadır. Son bölümde, girişimci devlet ile kalkınmacı devlet arasında bir karşılaştırma yapılarak, teorik olarak girişimci devletin esas olduğu ve kalkınmacı devlete göre çok sayıda avantaj sunduğu ortaya konmaktadır.

Anahtar Kelimeler: Büyüme, İnovasyon, Teknoloji, Girişimci Devlet, Kalkınmacı Devlet

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1. INTRODUCTION

In contemporary economies, the state is progressively gaining strength and employing a wider range of instruments. It has been observed that robust and dynamic economies necessitate the presence of a strong state (Weiss and Hobson, 1999). According to Polanyi, the state assumes the role of a centrally planned tool that establishes and sustains a free market through interventions (Polanyi, 1944). Polanyi's perspective posits that the state intervenes in the market and primarily serves its interests. However, neoclassical economists argue that the state should exercise caution in its interventions and regulations. The power of the state is contingent upon its ability to coordinate and assess the resources, including labor and capital, utilized in a country's investments (Weiss and Hobson, 1999).

Evans (1995) posited that the state plays a multifaceted role in development, including the roles of custodian, demiurge, midwifery, and husbandry. The custodian role entails a state that controls and restricts the progress of the private sector, rather than one that supervises and encourages it. The demiurge role, on the other hand, advocates for a state that dominates the market and does not leave it to the private sector. The midwifery role model depicts a state that encourages the private sector and companies, while the husbandry state goes a step further by providing the necessary conditions to help the private sector in risky areas.

One of the defining characteristics of the modern state is its power to monopolize the means of taxation, which is closely related to its economic function. This monopoly was not easily obtained and required significant efforts to strengthen the state. In France and Russia, this process was marked by open conflicts, while in England, it was achieved through the gradual weakening of the nobility in favor of the state and central authority over time (Weiss and Hobson, 1999).

Neoclassical economics posits that the market functions as a mechanism for the efficient allocation of resources. The classical understanding maintains that the market can allocate resources correctly even in the absence of state intervention, and views state regulations as unnecessary. The soft neoclassical approach advocates for limited state intervention to facilitate the proper functioning of the market (Palley, 2012: 197-198).

The state plays a central role in the economy within both neoclassical economics and heterodox economics. Through its positions as regulator, determiner of monetary policy, and overseer of public investments, the state has the ability to influence and guide the trajectory of the economy. In fulfilling these roles, the state assumes three fundamental responsibilities. Firstly, it acts as a regulator, employing laws, regulations, and institutions to shape the economy. By determining the allocation of credit, incentivizing certain sectors, and directing investments, the state effectively serves as the steering mechanism for the economy. Secondly, the state assumes the role of an investor, strategically developing sectors of its choosing and exerting influence over the financial system, potentially crowding out the private sector. Through its investments, the state generates externalities that impact the private sector, such as the construction industry benefiting from infrastructure projects. These investments require limited national resources and involve various stakeholders, including raw material suppliers, subcontractors, and transporters (Arpacı, 2011: 118). Consequently, state investments are crucial in this context. The planning role is closely intertwined with the first two roles, as the state can act as both an actor and director in the planning process, enhancing its effectiveness. Public institutions play a significant role in fostering innovation, with legal legislation sometimes compelling employees and institutions to innovate.

Joseph Schumpeter (1912; 1942) introduced the concept of innovation as a key driver of economic performance, emphasizing the importance of credit and capital markets in fostering innovation at both the firm and economy-wide levels. Schumpeter also highlighted the

relationship between creative destruction processes and innovation in the literature. The production of technology that provides a competitive advantage is strategically crucial. Technology is closely linked to science, and its development is parallel to the advancement of science (Adams, 1999). Innovation is often dependent on technology, with one technology often paving the way for multiple innovations. The development of technology is typically more challenging, costly, and time-consuming than producing innovation (Weiss, 2014; Mazzucato, 2015a). According to Schumpeter, the state can occasionally assume an entrepreneurial role by introducing innovations, albeit temporarily. This entrepreneurial role of the state can manifest through institutions or interventions in specific industries. The establishment of physical and institutional infrastructure that stimulates and enhances innovation in an industry is also associated with entrepreneurship as a sustainable policy (Ebner, 2007: 105). For instance, the discovery of electricity occurred towards the end of the 19th century, but its widespread utilization was limited until the onset of the First and Second World Wars. Following these global conflicts, there was a significant surge in the use of electricity. An illustrative example of the defense industry's contribution to economic development can be observed in America's provision of support to universities and small to medium-sized companies after the Vietnam War (Ruttan, 2006). In this context, it is clear that the technology that the state has created turned into innovations in the long run.

Upon examining current examples, innovations, and their origins, it becomes evident that the technologies forming the foundation of many innovations were initially developed by the state, with subsequent private sector advancements. The rapid recovery and growth experienced, particularly after wars, cannot be solely attributed to the base effect. Furthermore, the development of superior technologies by states through extensive R&D (research and development) during wartime yields positive externalities. Investments in R&D within defense and defense-related industries play a crucial role in the advancements of aviation, nuclear energy, the computer industry, semiconductors, the internet, space communication, and earth observation technologies (Ruttan, 2006). In this regard, states in particular wars, play a crucial role in creating technology.

The need for an entrepreneurial or developmental state arises from the fact that companies are primarily motivated by factors such as profit maximization and financial flow, whereas the state is not constrained by such considerations. The state can therefore make investments that involve greater uncertainty and take greater risks than the private sector, as the state is not subject to the same financial pressures as private companies (Eisinger and Robert, 1988).

The role of the state in terms of economic growth is often obscured in R&D. In the American economy, the government accounts for 26% of total R&D spending, with the state funding 57% of basic research expenditures, while the private sector funds only 18% (Mazzucato, 2015:67). The dominance of the state in basic research is particularly noteworthy in the U.S. economy, where market fundamentalism is prevalent. This raises important questions about the role of the market economy and the state in promoting innovation and scientific progress.

The rest of this paper is organized as follows. In section II, I described the controversial role of the state in the economy and how the entrepreneurial state emerged in the historical process and what functions it performed. I also examined the Chinese example by explaining the developmental state and the experiences of Asian countries. To illustrate the conceptual framework, I explained with data how the U.S. economy, with its dynamic industries, creates innovative companies and, accordingly, new jobs. Not only limited to the U.S., I also discussed how much the governments invest in basic research expenditures in Europe, Asia and the U.S.

by adding an data table. In Chapter IV, a comparison was made between the entrepreneurial state and the developmental state, highlighting that they do not necessarily have to be mutually exclusive. Additionally, the benefits and importance of the entrepreneurial state were discussed.

2. METHOD

In this paper, descriptive methods were used and the analysis of the historical process was conducted alongside theoretical comparisons and discussions. Furthermore, historical instances, data tables, and graphs were gathered to substantiate the hypothesis. Initially, the concepts and their methodologies were clearly outlined and supported with data. Subsequently, a comparison and a discussion of the concepts were presented to reinforce the argument that the entrepreneurial state proves to be more efficient. Firstly, in the literature, the role of the state in economic development is defined using historical examples and data. In the literature, the place of the state in economic growth is described with its historical development and theoretical background. Then, the actual situation in the U.S., China, Asian, and European countries was examined with various data and tables to support the hypothesis of the study.

The paper explores two research questions. The first one is that how state interventions affect economic growth and how the main state models interact with economies. The second question is that how the state model in the U.S. fosters new innovative firms and sectors and more qualified jobs based on these new innovative companies. As a research puzzle, in contrast to the fundamental view regarding state interventions for market economies, it is seen that the state plays active roles both in U.S. and in Asia. The paper also questions this research puzzle and explores possible answers via theories, historical data, and cases such as the success of public institutions in U.S., and China.

3. ENTREPRENEURIAL STATE AND DEVELOPMENTAL STATE

The development of the innovation system in the United States underwent a significant transformation in 1957, marked by two key events. The first event was the launch of Sputnik by the Soviet Union in October 1957, which caused considerable concern among U.S. policymakers regarding the potential loss of technological superiority to their Cold War adversary. In response, the U.S. government implemented various measures, including the reorganization of the space program through the establishment of NASA (National Aeronautics and Space Agency) and the enactment of the National Defense Education Act to enhance education in math and science. However, the most significant change in terms of government involvement in technology development was the creation of the DARPA (Defense Advanced Research Projects Agency) within the Department of Defense in 1958 (Roland 2002; Bonvillian 2009). In this particular context, especially following the 1990s, American companies have consistently been positioned as the most innovative and profitable entities in numerous rankings, surpassing their counterparts. According to ‘’visualcapitalist’’ in 2023, 15 of the 20 most innovative companies are U.S. companies (Lu, 2023). Notably, most of these U.S. firms are relatively recently established companies.

The concept of the entrepreneurial state emerged in 1959 with subsequent articles by Arrow (1962) and Nelson (1959) addressing the issue of science and technology production. Nelson (1959) and Arrow (1962) raised concerns about the private sector's motivation to invest in science and technology. Another study found that the private sector tends to allocate insufficient resources to basic research while overinvesting in applied research (Akcigit et al., 2013:37).

Instead of allocating resources to fields such as science and technology that offer long-term societal benefits, companies tend to prioritize investments in areas that generate short to

medium-term demand and immediate profit gains. Furthermore, accurately forecasting long-term demand is challenging, making long-term science, technology, and R&D investments inherently risky. The outcomes of science and technology R&D expenditures are uncertain and this uncertainty cannot be quantified. Consequently, the private sector perceives such investments as significant risks. In contrast, the entrepreneurial state model assumes risks that the private sector is unwilling to bear and directs funds toward science and technology research that yields substantial social advantages (Mazzucato, 2015a).

In 1953, the United States allocated a total of 5.4 billion dollars for R&D expenditures. Of this amount, more than half was dedicated to technology-related endeavors, while the remaining funds were allocated to scientific research. However, only 435 million dollars were specifically designated for basic research. Nelson observed that during this period, the allocation of funds for basic research and development activities was disproportionately low compared to other research and development endeavors. He further deliberated on the appropriate level of investment in basic research, considering the potential for innovation and economic value creation through scientific research, particularly in its basic form. According to Nelson, basic scientific research involves the advancement of knowledge and can be categorized into two components: the acquisition of experimental data and the development of theoretical equations. Scientific research often leads to inventions, which encompass the creation of improved products and processes (Nelson, 1959: 298-299). The challenge lies in determining the optimal level of investment in basic research to maximize societal benefits. This question does not have a definitive answer due to the inherent uncertainty associated with research outcomes and its connection to investment savings. However, it is widely acknowledged that higher R&D investments are instrumental in generating more inventions and technologies. While basic research yields uncertain positive economic externalities, mission-oriented projects not only generate economic benefits but also contribute to social welfare.

For private sector entities, engaging in scientific research entails uncertainty in terms of profitability. This uncertainty, as Arrow noted, extends beyond mere risk and encompasses a broader sense of uncertainty. Companies may not achieve desired outcomes from basic research or may unexpectedly obtain inventions that surpass their initial expectations. In contrast, public institutions often obtain significant benefits from basic research, as they are not solely driven by profit motives. Due to their inherent characteristics, the innovations that arise from scientific research may not possess economic worth for companies operating within specific sectors and industries. This unpredictability, coupled with the positive externalities associated with scientific advancements, suggests that it is the responsibility of the state to assume this role (Nelson, 1959: 300; Arrow, 1962: 610).

Arrow (1962) discusses the concept of risk level and the preferred risk level that entrepreneurs can undertake. He highlights the high-risk nature of inventions as an investment. The state, as an organization, is also capable of taking high risks. The allocation of resources is affected by uncertainty, which plays a crucial role in the process. Invention and research are products of knowledge, and information is good that differs from other goods and involves greater uncertainty in its production. Arrow suggests that due to the risks involved in producing knowledge, either the state or a non-profit institution should be responsible for producing inventions and science. The problem of the indivisibility of knowledge makes it more appropriate for the state and universities to conduct scientific research, as the private sector is likely to avoid such research due to its indivisibility. Arrow argues for the need for an entrepreneurial state, an institution that is not concerned with profit and loss, to undertake

scientific research and invention, particularly in light of the risks arising from uncertainty and the indivisibility of knowledge (Arrow, 1962: 614-623).

Looking at the historical process in Table 1. and data, it can be seen that the U.S. has been investing large amounts in public research, which has long been publicly funded and where the private sector does not want to invest for the reasons explained above. It is also seen that China has invested heavily in public research, especially in recent years. As illustrated in Table 1, both China and the U.S. allocate more resources towards public research compared to other nations. China, in particular, stands out not only as a competitive nation striving for technological catch-up but also as a country actively pursuing technological advancements similar to the U.S.. Hence, the entrepreneurial state and developmental state frameworks are not mutually exclusive and can be implemented concurrently, irrespective of the initial conditions of the countries.

Table 1. Public Research Expenditure (million dollars, 2015 constant PPP)

	Germany	France	S.Korea	Japan	USA	China
2015	30.936	21.029	16.441	28.956	128.850	65.267
2016	31.656	21.018	17.611	27.616	124.851	68.101
2017	31.830	21.453	18.202	25.973	125.219	77.846
2018	34.482	20.078	19.023	25.300	125.061	85.240
2019	35.705	19.836	19.623	25.132	130.811	93.958
2020	36.692	20.041	20.678	25.211	133.238	105.949
2021	37.272	19.493	23.048	25.380	142.778	111.959
2022	38.758	20.692	25.116	26.594	141.128	117.553

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As Mazzucato noted 'The Apple company use 'DARPA' and 'NASA' oriented technologies for new innovative product, technology diffusion from public institutions to private companies is a historical fact. In this context, GPS (Global Positioning System), wireless technologies, microchips, and artificial intelligence all can be considered public-oriented spinoffs that trigger many innovations later (Mazzucato, 2011).

The private sector, driven by profit maximization, seeks to generate substantial profits while minimizing costs. Consequently, the innovations it pursues are primarily goal-oriented and geared towards short-term profitability. However, these innovations tend to be conservative in terms of the risks they entail. A company's R&D department is unlikely to allocate funds toward an invention that may or may not result in innovation. While certain inventions hold market value and can be transformed into innovations, others may not be marketable. Consequently, the private sector can only undertake rational risks that are significant enough to avoid bankruptcy. It is not reasonable for companies to expect their R&D departments to solely focus on inventing or conducting scientific research. Only the state, unconcerned with immediate costs or profits, can undertake such substantial risks, as theoretical evidence suggests that they will yield long-term profitability (Nelson, 1959; Arrow, 1962; Christensen, 1997; Weiss, 2014; Kaplan, 2018).

Another concept relevant to innovation and growth is mission-oriented growth. Mission-oriented growth refers to a multifaceted approach to growth that stems from conducting research and development centered around a specific mission, while also benefiting from its economic, public, and social advantages. Given that outcomes and externalities extend beyond economic profit, public involvement and management are crucial. Consequently, it emphasizes the importance of the public sector developing R&D projects based on mission-oriented, innovative growth (Hekkert, Janssen, Wesseling, & Negro, 2020: 77).

The Apollo project and the 'New Manhattan' projects in the United States exemplify mission-oriented R&D initiatives that were supported by the government. These projects have socio-economic objectives that address broad social and economic issues resulting from market failures, or the market's inability to finance such endeavors. Mission-oriented R&D projects can encompass various sectors, including defense, agriculture, health, energy, and the defense industry. Agriculture, in particular, has been a mission-oriented growth area in many OECD countries, receiving support from both the government and universities. While energy R&D projects in England are state-supported and focused on a singular purpose, the United States adopts a more diverse approach, organizing such projects around multiple objectives. In China, state-owned enterprises have also played significant roles in implementing and adapting new technological solutions (Foray, Mowery, and Nelson, 2012).

The significance of comprehending the role of the government in public-private partnerships has become increasingly crucial in light of pressing socioeconomic issues like climate change and population aging (Foray et al., 2012). These challenges necessitate an engaged State that actively participates in addressing them. For instance, NIH (National Institute of Health) has long been developing vaccines to contribute to social health issues and to prevent potential epidemics. Moreover, the vaccines formulated during the outbreak period were also nurtured by the fundamental research conducted by NIH. Throughout the early 1990s, Congress and the National Institutes of Health (NIH) allocated 10% of the NIH's annual budget specifically for HIV/AIDS research. This funding initiative persisted until 2016, facilitating significant discoveries regarding the virus and contributing to a broader comprehension of other viral infections. Moreover NIH investing in mRNA mRNA-based vaccines for a long, therefore companies could improve mRNA vaccines based on this research (NIH/gov).

Nelson (1962) asserts in his article that many marketable products were conceived by scientists, with the market subsequently transforming these inventions into viable products over time. For instance, transistors, which serve as the foundation for contemporary radar systems and computers, were initially developed by scientists and later commercialized by the market. Although Bell Telephone Laboratories announced the development of the transistor in 1948, it was not until 1952 that three scientists were awarded the Nobel Prize for their contributions to the principles underlying the transistor (Nelson, 1962: 549-550).

In the United States, institutions such as DARPA and NASA have played a pivotal role in facilitating private sector advancements by investing in basic research and development, unafraid to undertake risks due to their status as government entities. Recognizing the significance of research, the state allocates substantial budgets to its institutions to conduct research, take risks, and foster innovation. As of 2020, DARPA's budget stands at 3.5 billion dollars, representing less than 1% of the United States' overall research and development investments (Nature 579, 2020: 173-174).

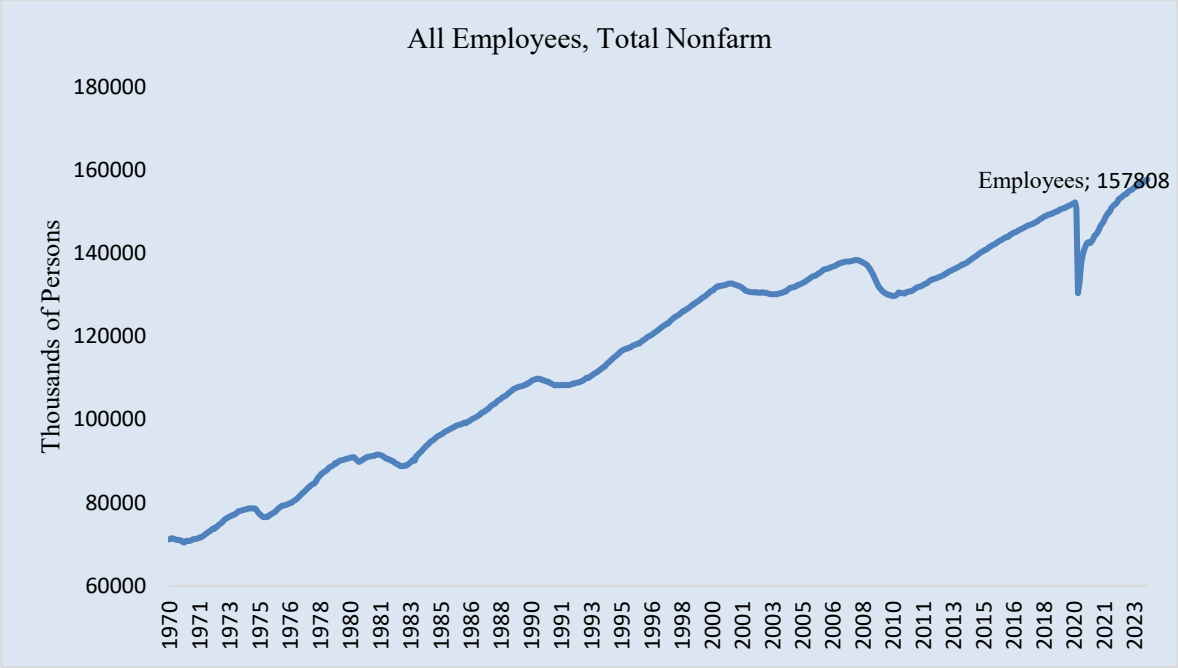
DARPA, the Defense Advanced Research Projects Agency, can allocate its budget towards R&D expenses without the need to prioritize profit. Established to ensure technological superiority for the United States, DARPA employs over 240 highly skilled researchers

(Mazzucato, 2011: 70). Similarly, NASA invests in advanced computers, materials, and technologies that can be utilized in space exploration, while also establishing technological infrastructure that can later be utilized by the private sector. This results in significant R&D expenditures. In a broader sense, the concept of the entrepreneurial state, as defined by Ebner (2006) and Mazzucato (2015a), encompasses most of the functions typically associated with a company. Within this framework, the entrepreneurial state assumes the role of a risk-taking and innovative entity. The U.S. has achieved remarkable success in the field of innovation and technology, making it the leading country in these areas globally. This success can be attributed to several key factors, including the country's higher education system, the productivity of its institutions, and the effective sharing of this productivity with the private sector through mechanisms such as spinoffs (Ruttan, 2006; Block and Keller, 2015).

The primary objective of the entrepreneurial state is to ensure that technological innovations have a widespread impact on the economy, with a particular focus on groundbreaking advancements. Historically, the entrepreneurial state has involved temporary funding and support from the government for specific elite institutions, enabling them to undertake and deliver projects. Consequently, the concept of the entrepreneurial state has evolved from the developmental state, combining state-driven entrepreneurship with innovative creativity (Ebner, 2007: 104). The entrepreneurial state represents a state model that actively seeks solutions to socio-economic problems and is willing to make risky R&D investments in these areas. It functions as a state model that generates positive externalities by sharing the scientific and technological outputs that emerge during the search for solutions to socio-economic problems with both society and the private sector. In the long run, this approach not only provides solutions to socio-economic problems but also facilitates the dissemination of scientific and technological innovations to the private sector (Mazzucato, 2015a).

In this regard, while the U.S. created 29 million jobs between 1980 and 1998, Europe, which has a larger population and hosts the world's most important economies, could only create 4 million jobs in the same period. In the approximately twenty-year period mentioned, America laid off the jobs of 44 million people. By creating 73 million new jobs, it compensated for the unemployment of 44 million people and paid high wages to two-thirds of the people for whom it created new jobs. Since companies that generate high profits by creating new markets have been established, not only new employment has been created, but also qualified workforce employment. In the same period, while only 4 million new jobs were created in Europe, there was no decrease in employment due to strong unions and the non-dynamic traditional economic structure (Peters, 2005: 41). This example demonstrates the notable disparity in dynamism between the United States economy and Europe economy. Since the entrepreneurial state approach began after the 1960's in the U.S., following this time frame technological advancement and spinoff process has accelerated.

In graph1. It is illustrated that from 2003 to 2023 U.S. could manage to create approximately 28 million jobs. During this period, U.S. also created significantly innovative firms such as Alphabet, Meta, Apple, Tesla, Nvidia, etc. These innovative, highly productive firms also create and require skilled, high-value workforce who are also well paid. In this context according to Business Insider's research, tech companies pay an annual average wage salary between 200.000-450.000 US dollars (Business Insider, 2023).



Source: U.S. Bureau of Labor Statistics

Graph1: U.S. Employment

Though income inequality is high in U.S., there is a well-paid middle class that is supported by tech companies. However, historically between 1980 and 2009, real wages stayed way below in comparison to productivity increase in the U.S. production, where average real wages increased by 8% while productivity increased by 80% (Reich, 2011).

According to Ebner (2007), the concept of the entrepreneurial state encompasses several key functions. Firstly, it establishes the relationship between technology and the economy and creates the necessary structural and institutional infrastructure to support this relationship. Additionally, in conjunction with the techno-economic paradigm, it promotes openness and competitiveness by implementing policies that guide both national and international companies. Furthermore, the entrepreneurial state plays a crucial role in enhancing entrepreneurial capacity and fostering innovation in an uncertain environment. It achieves this by providing technological leadership and ensuring that innovations are brought to light. The state's institutional architecture facilitates the transfer of information between the state and society, while also employing multi-layered state management as a policy tool. Moreover, the entrepreneurial state ensures the continuation of competition in knowledge-based interactions by incorporating new companies (start-ups) into market-oriented, complex institutional networks that replace the traditional national innovation system. Within the framework of the techno-economic paradigm, the entrepreneurial state determines and implements institutional changes and provides political leadership for technological innovation (Ebner, 2007: 118).

In terms of resource utilization, the entrepreneurial state actively seeks, identifies, consolidates, and organizes resources in a mission-oriented manner (Sun, 2015). This involves preparing projects or institutions and effectively utilizing human resources, institutions, and legislation. Additionally, addressing social problems requires mission-oriented research, which encompasses technological innovations that offer behavioral and systemic solutions. This research spans various fields, ranging from internet technology to biotechnology and nanotechnology (Foray et al., 2012).

The classical view suggests that the state should not interfere with the private sector and should only intervene to ensure that the market functions efficiently. However, the state must address problems that the market economy cannot solve, such as global warming, youth unemployment, inequality, and obesity, by not only intervening but also leading. By actively creating markets, the state can direct the private sector towards new techno-economic paradigms (Mazzucato, 2015b: 62-63). Public institutions have played a significant role in the implementation of various technologies that are widely used in developed economies today. These technologies include biotechnology, material technologies, aviation technologies, and information and software technologies, among others. Notably, the defense industry has contributed considerably to the outputs and externalities of these technologies. For instance, the GPS, which is utilized in numerous technological devices, was implemented in the 1970s through the "Navstar" program of the American Army. Similarly, the touchscreen technology used in the iPhone was developed by FingerWorks, a company founded by a professor at the University of Delaware, who received a scholarship from the National Science Foundation and the CIA. Additionally, Siri, a combination of voice command and artificial intelligence used in the iPhone, was initially developed as a project of the DARPA (Mazzucato, 2015b: 64).

During the 1950s and 1960s, structuralist development theory emerged as the prevailing perspective in the field of development theory. According to this school of thought, market failures were viewed as a phenomenon specific to underdeveloped economies, and the state was deemed to have a crucial role in rectifying this issue. However, neoclassical economics has presented a counterargument to the structuralist view, which is based on three key points. Firstly, neoclassical economists contend that the root cause of market failure is the excessive intervention of the state, which is not competitive enough and leads to the creation of inefficient industries based on import substitution industrialization. Secondly, the neoclassical perspective argues that the business sector, which seeks rent due to the excessive interventions of the state, fails to enter into productive and competitive areas, thereby hindering the efficiency of resource allocation in the economy. Instead of being efficient and competitive, the private sector engages in lobbying activities to obtain government incentives. Thirdly, neoclassical economists point to the high growth rates of East Asian countries, particularly the Asian Tigers (Taiwan, South Korea, Hong Kong, and Singapore), which are based on an economic structure that promotes income equality and a competitive private sector (Öniş, 1991: 109).

In his 1982 book MITI and the Japanese Miracle (1925-1975), Chalmers Johnson elucidates the concept of the developmental state. He posits that the source of economic growth lies in the strategic economic planning carried out by bureaucrats, who are not bound by short-term populist policies like politicians. This planning, according to Johnson, ensures long-term growth. Johnson (1999) further defines the developmental state as the role played by the Japanese state in post-war economic development. However, he emphasizes that the state never claimed sole responsibility for growth, as is the case in command economies (Johnson, 1999: 33). Consequently, the developmental state approach, as defined by Johnson and subsequently embraced, is a model of planned growth in which the private sector is involved in the decision-making process alongside bureaucrats and institutions, as exemplified by Japan (Öniş, 1991: 118-119).

In contrast to the regulatory state, the developmental state endeavors to enhance competitiveness in specific sectors by guiding markets and industries through the implementation of plan-rational, goal-oriented strategies. It functions as a decision-making mechanism, targeting particular industries for private sector involvement (Johnson, 1982: 19).

The role of the state in facilitating the rapid economic growth of East Asian countries has generated significant scholarly interest and discussion, particularly concerning the

transformation of industrial structures and the promotion of development. This phenomenon, often referred to as the "East Asian Miracle," gained prominence following the release of the World Bank's report in 1993. Consequently, the role of the state in development, specifically in terms of catching up with economically advanced nations, has been a focal point of important debates, particularly concerning the so-called 'Asian Tigers' - South Korea, Taiwan, Hong Kong, and Singapore. According to the developmental state approach, economic growth is driven by private sector investments and the development of human capital within a macroeconomic environment characterized by efficient resource allocation, technological convergence, and a stable legal infrastructure. The Johnson model further elucidates the concept of the developmental state, positing it as a state model that involves government interventions in the market. In this model, a partially autonomous bureaucracy, guided by an elite bureaucracy, regulates and directs industrial policies (Ebner, 2007: 106).

The developmental state model is a product of the collaboration between the state and the private sector and represents an economic development model that acknowledges the efficacy of the free market while relying on bureaucratic and institutional guidance to steer the private sector. Within this framework, an institutionalist perspective plays a crucial role in the industrialization phase. The central question pertains to the extent of state intervention and market orientation that will be provided (Öniş, 1991: 110).

The developmental state is characterized by its developmental and progressive nature and serves to unveil technological innovations through developmental transformations. In East Asian countries, the ability to combine regional and global resources is deemed essential for sustaining economic development. In this context, the institutionalist approach to the evolution of institutions and technology examines the developmental impact of institutional networks in the process of developing and assimilating new technologies, by enhancing institutions and technology (Ebner, 2007: 104).

The socio-cultural effects of the developmental state and its applicability to East Asia are additional aspects worth considering. It is worth questioning whether the success of the developmental state model can be attributed to its compatibility with the cultural, historical, and sociological characteristics of East Asian societies, or if it can be universally applied. Furthermore, it is important to determine whether the developmental state model necessitates a specific type of regime, or if it can be implemented in liberal economies as well. The South Korean case study demonstrates that these questions do not have straightforward answers. It reveals that when certain sectors are prioritized for state intervention, other sectors may only be subject to such intervention on a limited basis. In this particular case, the focus was on rapid industrialization rather than comparative advantages and profit motives. The bureaucracy played a crucial role by providing clear targets and incentives, thereby mitigating the long-term risks inherent in a market economy (Öniş, 1991: 111-112).

In addition to well-known state approaches, China has effectively implemented both the entrepreneurial state and developmental state simultaneously for an extended period. China's economic strategy involves not only engaging in low-cost production to compete with Western countries but also investing in long-term space exploration and public basic research. Thus new technologies that are created by public institutions, lead to hundreds of innovative companies for the Chinese economy. For instance, the Chinese Academy of Science, recognized for its cutting-edge research, has a staff of over 56,000 researchers, with 22,800 serving as research professors or associate professors. By 2014, the number of technology transfer processes conducted by CAS had reached 10,538. In that same year, the CAS subsidiaries recorded a remarkable achievement, with over 700 of them collectively generating an impressive revenue of around US$56 billion (cas.cn, 2024).

The Chinese economy, which has experienced rapid growth since the 1980s, has demonstrated its ability to produce high technology rather than relying solely on the production of inexpensive goods. This capability is rooted in historical technological advancements and a strong emphasis on basic research. For instance, China's successful launch of an experimental biological rocket carrying white mice on July 19, 1964, marked a significant milestone. Subsequent achievements, such as sending Astronaut Yang Liwei into space in 2003 for a 21-hour mission, further highlight China's progress in space exploration (reuters.com, 2020). Additionally, the increase in the number of objects launched by China from 11 in 2004 to 182 in 2022 showcases the country's advancements in space technology (Mathieu and Roser, 2022). Furthermore, China's strategic entry into various industries like automotive, electronics, manufacturing, textile, and mechatronics reflects its competitive and forward-thinking approach, similar to a developmental state. Entrepreneurial-developmental states in this particular context do not conflict with each other. Furthermore, the entrepreneurial state fosters rapid and more innovative sustainable growth, as evidenced by the example of China.

4. COMPARISON OF ENTREPRENEURIAL STATE AND DEVELOPMENTAL STATE

The state's role is particularly crucial in the realm of R&D, which is widely regarded as the engine of economic growth. In contrast, Asia has been a rapidly growing model with a thriving private sector, but it has not been as successful as the United States in terms of development and innovation. This can be attributed to the underdevelopment and insufficient infrastructure of scientific research systems in East Asia, as noted by Ebner (2007: 114). For instance, the United States invests heavily in supporting universities, public research institutions, and industrial R&D areas in unexplored and underinvested regions. The growth phase propelled by innovation presents a contradiction to the developmental state's definition, which is primarily based on the imitation, adaptation, or development of technology. Conversely, the entrepreneurial state adopts a strategic entrepreneurship perspective, emphasizing the transformation of resources into opportunities and the effective utilization of resources. The critical issue at hand is whether sufficient resources will be allocated to fundamental scientific research. The entrepreneurial state model allocates the most resources and attention to scientific research, and its existence is attributed to the inadequate resources in this field and the market's incapacity to resolve this issue independently (Sun, 2015: 648-649).

The developmental state is essentially a state model that lags behind developed countries and acknowledges this fact. It aims to be more efficient and competitive in sectors where developed countries excel and strive to catch up with technology. In contrast, the entrepreneurial state prioritizes scientific and technological development, encouraging researchers and knowledge sharing. It is a state that aspires to be a long-term leader, making it a progressive and pioneering state. For a country like the United States, which is advanced in science and technology, the entrepreneurial state model aims to continually create more efficient sectors and technologies, staying ahead of other countries. The creation of new sectors is also a distinct dimension of competition. The creation of new sectors and markets, which are decisive at the technological level and constantly increasing added value, is more effective and inherently more profitable than catching up and developing existing technologies. The profit here can be compared to that of a monopolist. The effectiveness of the American entrepreneurial state model and competition model is demonstrated by the fact that many American companies are pioneers and have dominated the market for an extended period (Ebner, 2007: 104-105).

The developmental state perspective aims to narrow the gap between developed and developing countries, while the entrepreneurial state actively contributes to the emergence of

innovations, technology diffusion, and adaptation. These elements are integral to the concept of the entrepreneurial state (O'Riain, 2014).

Another distinction lies in the fact that the developmental state focuses on competing in existing sectors, necessitating cost reduction and competition based on both cost and quality. Conversely, the entrepreneurial state creates new sectors, shifting the focus of competition from cost and quality to differentiation through innovation (Peters, 2005). As Christensen (2006) US. companies are very capable of doing disruptive innovations. For instance, when American companies began producing smartphones or when Apple introduced the iPod, they enjoyed unrivaled success and sustained high profitability rates by leveraging innovation and differentiation rather than cost reduction (Porter, 2008).

In contrast to the passive regulatory role of the developmental state, the entrepreneurial state actively invests in project-mission-oriented R&D projects, takes risks in basic research, and generates innovations that serve as the foundation for progress via spinoffs from public institutions. This proactive approach by the state fosters innovation and sustainable growth. Entrepreneurship, characterized by risk-taking, aligns well with the state's role in assuming significant risks to drive innovation, making it the most entrepreneurial entity (Mazzucato, 2015a). Basic research plays a crucial role in technological advancements and overall development. As noted, basic research plays a significant role in creating technology. In this regard, comparing basic research and publicly funded basic research investments (see Table 2), it is evident that U.S. and Chinese governments invest more resources. In particular, in comparison to other European and Asian countries, China invests more in basic research that is funded by the government and in higher education institutions. In this context, not surprisingly China has not only higher growth rates and competitive companies but also creating advanced technologies at the same time.

Table 2. Basic Research and Source of Funds, 2019 (Billion Dollars)

	Public	H. Education	Private
Germany	8.37	13.5	5.7
France	2.24	8.6	3.26
Japan	3.05	7.7	10.27
S. Korea	2.67	3.3	8.54
USA	11.3	46	29.8
China	13.07	16.8	11.8

Source: OECD

The entrepreneurial state and the developmental state are two distinct approaches to state intervention in economic development. While the former emphasizes strategic management and high-risk, high-return opportunities, the latter prioritizes state-private sector cooperation and bureaucratic support. The developmental state model, exemplified by Japan and South Korea, is more prevalent in Eastern countries, where the state provides significant support to the private

sector. In contrast, the entrepreneurial state model is more dominant in America, where the state invests heavily in space research and defense industries.

The two models differ not only in their approach but also in their purpose. The developmental state aims to promote marketable products and targeted industries, while the entrepreneurial state focuses on scientific research and inventions that will have long-term social and economic outcomes. As a result, the entrepreneurial state is expected to produce more socio-economic output from its investments, even in the long run, while the developmental state provides a strong private sector and success in specific industries (Sun, 2015: 655). For example, both NASA and DARPA have made significant contributions to the development of GPS technology. It is widely acknowledged that GPS technology has sparked numerous innovations across diverse industries, including telecommunications, agriculture, financial services, and maritime sectors. The tangible economic impact of GPS technology on the United States economy has been estimated to exceed 1 billion USD per day (O'Connor, et al., 2019).

The developmental state primarily focuses on the production of marketable goods, whereas the entrepreneurial state prioritizes scientific research and the creation of innovative solutions that will yield enduring social and economic benefits. Consequently, the entrepreneurial state is more likely to generate greater socio-economic output from its investments, even in the long term. On the other hand, the developmental state aims to foster a robust private sector and achieve success in specific industries. Given their distinct objectives, it is anticipated that the outcomes of these two states will diverge. Hence, the entrepreneurial state and the developmental state differ not only in their approaches but also in their underlying purposes (Evans, 1995: 230-234).

Comparing the developmental state and the entrepreneurial state in terms of patents or innovations would lack meaningfulness. The quantification of patents does not necessarily equate to innovation, as it remains uncertain whether these patents truly contribute to novel advancements. Furthermore, distinguishing between different innovations often proves challenging in practicality. Conversely, both major and minor inventions and technologies gradually evolve into innovation, permeating various products and diverse markets. This process injects dynamism into the economy and produces surplus value. Through the "Spillover" effect, numerous countries can reap the benefits of these inventions and technologies, regardless of their geographical location (Freeman, 2013).

Although O'Riain (2004) does not fully employ the concept of the entrepreneurial state, he categorizes it into two distinct forms: the Developmental Bureaucratic State (DBS) and the Developmental Network State (DNS). The organizational state he defines deviates from the classical bureaucratic developmental state by incorporating entrepreneurial state characteristics. Consequently, the primary disparities between these two forms are as follows.

Firstly, the DBS fosters the creation of national champions through the management of dependency. It achieves this by implementing strategic protectionism, endeavoring to establish substitute industries, and striving to establish a local banking system. Conversely, the DNS establishes global connections by acting as a mediator, establishes local networks by utilizing global capital, and expands local innovation networks to a global scale.

Secondly, the DBS is closely affiliated with the state bureaucracy, necessitating accountability to the state and undergoing inspection and evaluation. In contrast, the DNS operates based on flexible structures and is evaluated according to its external impact. It is not established with the same level of tight ties as the DBS. In summary, O'Riain's conceptualization of the entrepreneurial state encompasses the DBS and DNS, each exhibiting distinct characteristics and approaches to economic development. The bureaucratic

developmental state is reliant on a rigid state bureaucracy, whereas the organizational developmental state is founded on a fragmented state structure that allows for autonomy and freedom. These descriptive functions not only distinguish the entrepreneurial state from the developmental state but also highlight the divergences between them. In light of this, it is evident that the developmental state and the entrepreneurial state are markedly distinct from one another, both in terms of their objectives and their structural and organizational frameworks (O'Riain, 2004).

In nations where the entrepreneurial state holds sway, such as the United States, scientific research is primarily funded by state institutions or indirectly supported by the state. Consequently, these countries anticipate the emergence of revolutionary and radical innovations. Conversely, in countries where the developmental state approach is predominant, the focus lies on enhancing the quality, competitiveness, and stable economic growth of specific products and sectors. During the 1800s, the United States did not possess significant scientific prowess. However, by 1890, the nation had emerged as a leader in sectors such as steel, railways, and chemicals. Subsequently, the development of military technologies in 1910 led to an increase in research conducted within universities. Furthermore, public investments in research experienced a surge during the world wars (Taylor, 2016).

Numerous effective policies in the realm of innovation and technology have been formulated not by the developmental state model, which aims to establish national champion companies, but rather by decentralized public institutions that provide support to innovative enterprises through scientific research (O'Riain, 2004: 37).

In contrast to the developmental state approach, the entrepreneurial state is more inclined to foster the emergence of novel industries. The developmental state, on the other hand, aligns itself with a notion of competition centered on enhancing existing practices, as exemplified by Japan's principle of continuous improvement. For instance, while Detroit once reigned as a prominent force in the American automotive sector, it gradually ceded its dominance to Japan, which effectively implemented the developmental state model. However, in the aftermath of the 1990s, the U.S. experienced a remarkable breakthrough in the realms of internet informatics and electronics, thereby engendering new sectors and achieving rapid growth (Drucker, 2003).

Mazzucato (2011a) distinguishes between the developmental state and the entrepreneurial state and posits that the latter is more effective. In the context of the entrepreneurial state, Mazzucato provides policy recommendations. Specifically, the author suggests that the state should reduce direct transfers to the private sector and exercise control over the technologies that are developed using research-oriented small firms' funding.

The entrepreneurial state is characterized by its pursuit of technology and willingness to take risks, which aligns with the definition of an entrepreneur. In contrast, the developmental state model focuses on developing and encouraging individuals rather than researchers. The entrepreneurial state model seeks profit through various businesses, real estate investments, and productive investments, and is not based on monopoly profits, unlike other state-centered economic systems (Duckett, 1998: 170).

The developmental state has been widely recognized as a successful model. However, Asian developed countries have adopted a different approach, emphasizing competitiveness within their respective sectors and striving for greater efficiency in terms of cost and quality. This is driven by the need to meet targets and adhere to sector-specific regulations. In contrast, the entrepreneurial state is characterized by a focus on seeking out new technologies, rather than developing them in-house, and leveraging existing technologies to create new markets.

This state model is designed to generate a broad range of externalities that can yield not only economic benefits but also solutions to social problems (Ebner, 2007: 107). While the developmental state accepts the principles of the market economy and seeks to activate and accelerate these principles through coordination and encouragement, the entrepreneurial state acknowledges the limitations and shortcomings of the market economy. As such, it is based on a partially mixed economic structure, with the state playing an active role (Ebner, 2007: 118).

The developmental state model emerged to enable East Asian countries to narrow the technology gap with developed nations and enhance their efficiency and competitiveness (Johnson, 1999; Ebner, 2007). Conversely, the entrepreneurial state model aims to foster continuous self-improvement and creative destruction processes to attain and maintain excellence, irrespective of other countries. The entrepreneurial state model entails organizing state institutions towards a specific purpose, establishing collaborations and networks with the private sector, and engaging in the market with competitive institutions when necessary, rather than relying on monopoly profits (Duckett, 1988; Ebner, 2006; Ebner, 2007; Mazzucato, 2015a).

5. CONCLUSION

The widely accepted belief is that governments are needed to advance general welfare by providing national security, law, and order, by contributing to basic education and public health. Despite the evolving discourse on market-driven versus state-driven economies, the prevailing belief remains that governments intervene only when market failures occur (Nelson, 2022). The role of the state in the economy is of paramount importance in America, Asia, and Europe. In Asia, a developmental state model is employed to guide the private sector, while in America, a state model is adopted that fosters a dynamic economy through the development and diffusion of technology to the private sector. The U.S. state fostering model, commonly referred to as the 'entrepreneurial state', is renowned for its emphasis on technological progress and the generation of spinoffs.

Following the Soviet Union's success in aerospace, the U.S. state increased its focus on conducting more public research and creating more public-based technologies. According to Nelson (1959), private companies lack motivation, and therefore, the state needs to invest in science and technology. In the long run, with collaborations between public institutions and companies, U.S. companies could turn these publicly originated technologies into innovations. These productive public institutions and spinoffs they create helped U.S. companies become the most innovative firms among others, giving them a significant competitive advantage. While the entrepreneurial state model creates more profitable and new industries in the long run, the developmental state model is based on cost reduction and low profitability rates. In this context, in the long run, entrepreneurial state companies become more innovative by using technologies developed by the state.

In Asia, companies adopt a deliberate and fiercely competitive approach when entering established sectors. In contrast, Europe is home to long-standing companies that adhere to traditional practices and exhibit lower profit margins compared to their American counterparts. Conversely, American companies embrace a more innovative approach by pioneering new sectors through the application of emerging technologies. As a result, as Peters (2005) noted, during the period spanning from 1980 to 1998, Europe, with its substantial population and status as host to some of the world's most significant economies, was only able to generate a mere 4 million jobs. This stands in stark contrast to the United States, which managed to create a staggering 29 million jobs during the same period. Consequently, the United States economy has the potential to generate a greater number of job opportunities compared to Europe and Asia accordingly.

It is an established historical fact that the U.S. companies are both more innovative and profitable. As elucidated in this paper, U.S. companies are primarily reliant on publicly funded technologies known as spinoffs. Thus, U.S. companies can establish new sectors based on these novel technologies and American companies emerge as more innovative and profitable compared to their global counterparts. Notably, the Chinese model has recently gained prominence, as China employs both the entrepreneurial state model and the developmental state model in a harmonious manner. Theoretical debates and historical processes indicate that the entrepreneurial state model is indispensable in fostering competitive and innovative companies. In the light of theoretical comparisons and historical facts, it can be concluded that an entrepreneurial state is a must for dynamic and competitive sectors in the long run. Mazzucato (2015) pointed out that the entrepreneurial state model in the U.S. socializes risk without sharing rewards for the greater good of society, focusing solely on benefiting companies. Consequently, the socio-economically efficient and well-structured state model in the U.S. is subject to scrutiny due to these controversial elements. Moreover as U.S. example shows that state and public institutions can be very effective in doing technologies, triggering innovations, and creating new, well-paid employment. On the other hand, while socializing the risks of these investments, socializing the benefits of spinoffs is also very necessary for the well-being of economies. While U.S. and China exemplify how public basic research and institutions can be pioneering, the issue of how to socialize the benefits of state-oriented research outcomes needs to be explored. By doing so, efficient state models can be adapted to different countries' local economic systems. This adaptation will not only enhance welfare and foster innovation but also contribute to resolving socio-economic issues.

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