The Digital Platform Economy and the Entrepreneurial State: A European Dilemma

Zoltan J. Acs

Abstract The application of big data, new algorithms, and cloud computing is creating a digital platform economy (DPE) built around platform organizations and their platform-based ecosystem. We use the DPE Index to examine Europe's digital efficiency across countries and explain its global position by analyzing Brexit and the electric vehicle industry. We argue that the United Kingdom left the European Union because E.U. regulations were holding back the U.K.'s strong DPE and that a *weak* DPE is holding German back from being a leader in the electric vehicle industry. The problem for Europe's DPE is that the entrepreneurial state is strong and the private sector is weak.

Keywords Brexit · Entrepreneurship · Ecosystem · Governance · Multisided platforms · Platform economy · Competition · Users

1 Introduction

Hobijn and Jovanovic (2001) argued that the arrival of the information-technology revolution (ITR) in the 1970s created the need for new firms to emerge.[1] The technology breakthrough favored new firms for three reasons: awareness and skill; vintage capital; and vested interests. The stock market incumbents were not ready to implement the new technologies and it took new firms to bring the new technology to market. New capital flowed via venture capital to startups in the United States and Asia that built the new industries; but not in Europe (Gompers & Lerner, 2001).[2] Between 1980 and 2020, the U.S. stock market grew 30-fold. The five most valuable

[1] See also Greenwood and Jovanovic (1999).

[2] See Acs and Audretsch (1987, 1988, 1990), Audretsch (1991, 1995), Acs et al. (1992, 1994, 2002), Audretsch and Feldman (1995), and Anselin et al. (1997).

Z. J. Acs (✉)
George Mason University, Fairfax, VA, USA
e-mail: zacs@gmu.edu

© The Author(s) 2022

K. Wennberg, C. Sandström (eds.), *Questioning the Entrepreneurial State*,
International Studies in Entrepreneurship 53,
https://doi.org/10.1007/978-3-030-94273-1_17

companies in the United States in 2021—Apple, Amazon, Microsoft, Facebook, and Google—are valued at or near $2 trillion each (Berne, 2020; Yardeni & Abbott, 2021).

Two new *political economy* frameworks emerged in the 1990s to explain how the evolution of the ITR undermined Europe's approach to startups. The first was the *National Systems of Innovation* (Edquist & Johnson, 1997; Lundvall, 1992; Nelson, 1993) framework. Its main theoretical underpinnings were (1) that knowledge is a fundamental resource in the economy; and (2) that knowledge is produced and accumulated through an interactive and cumulative process of innovation that is embedded in a national institutional context. *National Systems* assumed this all took place in existing firms, so there was no need for new firms or entrepreneurship to bring the technology to market.

The second conceptual framework was the *Porter Diamond Theory of National Advantage* that identified an interactive system that propelled a country to prominence (Porter, 1990). The four facets of the Porter Diamond represented four interrelated determinates: firm strategy, structure, and rivalry; demand conditions; related and supporting industries; and factor conditions. Porter emphasized *factor conditions* because a country can create these for itself. They included but were not limited to knowledge, a large pool of talent, technological innovation, infrastructure, and capital, all embedded in regional clusters.[3]

The Theory of National Advantage and National Systems of Innovation had three assumptions in common: (1) they agreed that knowledge was a fundamental resource in the economy; (2) they agreed that knowledge is produced through an interactive process that is institutionally embedded; (3) they relied on existing firms to implement the new technologies! Both approaches had large theoretical literatures, empirical research, and policy recommendations. However, because they both excluded the role of new firms in their analysis—which was Jovanovic's great insight—their usefulness for understanding the new information technologies was limited because incumbent firms did not implement the new technologies (Jovanovic, 1982, 2001, 2019; Evans & Jovanovic, 1989).

The National Systems perspective was not without a role for entrepreneurs; the problem is rather that it contained everything and hence, it lacked explanatory or predictive value. In a corporatist environment, such a non-theory that contains all actors is bound to drift toward supporting the corporatist approach, with public private partnerships and large R&D programs to support industry. To overcome this lack of focus, Acs et al. "introduced a novel concept of National Systems of Entrepreneurship and provided an approach to characterizing them. National Systems of Entrepreneurship are fundamentally resource allocation systems that are driven by individual-level opportunity pursuit, through the erection of new ventures, with this activity and its outcomes regulated by country-specific institutional characteristics."

[3] These approaches were both underpinned by endogenous growth theory (Romer, 1990).

The entrepreneurship literature also missed the importance of entrepreneurs in bringing information technologies to market via new firms, as suggested by Hobijn and Jovanovic (2001), and by Joseph Schumpeter almost a century earlier (Lundstrom & Harirchi, 2018). To the extent that the entrepreneurship literature did study new firms, it focused on *self-employment,* both in terms of business ownership and sole traders. This was partly a result of industrial restructuring and the rise of unemployment (Parker, 2004). Job creation became the immediate focus of entrepreneurship research, especially in Europe (Birch, 1981).[4]

Sussan and Acs (2017) recognized this shortcoming and argued that a significant gap existed in the conceptualization of entrepreneurship in the digital age, precisely because it ignored the fundamental role of knowledge as a resource in the economy. To address this gap, Sussan and Acs proposed the Digital Entrepreneurial Ecosystem (DEE) framework, integrating two separate but related literatures on ecosystems: the digital ecosystem and the entrepreneurial ecosystem. This new framework situates digital entrepreneurship in the broader context of users, agents, infrastructure, and organizations, such that two biotic entities (users and agents) actuate individual agency, and two abiotic components (digital infrastructure and digital organizations) form the external environment.[5] Sussan and Acs integrated the DEE framework into the digital marketplace, including but not limited to e-government, e-transportation, e-education, e-commerce, and e-social networking-based businesses.[6]

Acs et al. (2021a, b) further develop the concept of the digital entrepreneurial ecosystem by introducing the global digital platform economy and measuring the firms that populate it (Kenney & Zysman, 2016). First, using a unique database of over five decades of surviving firms (Audretsch, 1991), they tested the Hobijn and Jovanovic (2001) thesis that the 1970s incumbents were unable to harness new technologies and that the entry of new firms was needed to create the DPE. Second, they developed a conceptual framework for the DPE that integrates (1) the platform-based organization; (2) their platform-based ecosystem; and (3) the digital technology infrastructure (Sussan & Acs, 2017; Song, 2019).[7] Applying the DPE framework to the global economy, Acs et al. (2021a, b) identified and measured platform economy firms that have publicly available data. They estimated that the global DPE consists of billions of supply-side and demand-side users, millions of app developers, thousands of digital infrastructure firms, and hundreds of multisided platform firms.[8]

This chapter examines the European Union's platform economy dilemma by using the new DPE Index to focus on Brexit and the electric car industry (Acs

[4] An exception to this was the Knowledge Spillover Theory of Entrepreneurship (Acs et al., 2009).

[5] Nambisan et al. (2019) approached the subject from the digital transformation side and discussed how it has transformed entrepreneurship and innovation.

[6] Malecki (2018) emphasized the regional aspect of entrepreneurial ecosystems and Cavallo et al. (2019) focused on present debates and future directions.

[7] See Nambisan (2017), Nambisan et al. (2018), and Sahut et al. (2021).

[8] For a comparison across countries.

et al., 2021a, b). The European lag in *platformisation* (the penetration of digital platforms into different economic sectors) stems from the facts that incumbent firms in Europe have not introduced new technologies in sufficient volume and startups have remained small and not scalable (Naudé, 2016). While most of the world has focused on a balanced approach to the digital revolution with the state playing a constructive role to promote the private sector, the European Union and Japan have chosen an unbalanced approach vis-à-vis public policy. Mazzucato (2013) suggests that U.S. success resulted not from entrepreneurship (a private initiative), but rather from the actions of the entrepreneurial state (a public effort). In her view, it is the state that drives entrepreneurship and not the solo entrepreneur or entrepreneurial team. No one would deny that state spending on R&D is important, always has been, and continues to be so. However, the state as entrepreneur is a necessary but not sufficient condition for economic growth (Acs et al., 2018; Lafuente et al., 2021). The European platform deficiency stems from a strong *entrepreneurial* state and a weak private sector. This precisely contradicts the Mazzucato argument.

The rest of this chapter is as follows: Section two outlines the evolution of managerial capitalism as it has existed from the twentieth century to the digital age in the twenty-first century. Section three presents the analysis of the DPE Index, and section four discusses why new firms are needed in light of the information technology revolution. The conclusion reports a strong correlation between the depth of the digital entrepreneurial ecosystem and economic development.

2 Background

What public policies promote economic growth? The question is as old as economics itself. An early answer was given by Adam Smith: Economic growth occurs when larger markets lead to higher income because of task specialization, leading to greater skills and proficiency of the workforce in each line of economic activity. Globalization promotes trade and specialization (Sachs, 2020). This invites us to examine a different question: What is the role of entrepreneurship in economic development in the twenty-first century?

Before the great recession in 2008, the U.S. economy had enjoyed remarkable economic success over several decades, as measured by the rate of productivity growth, which determines the long-term rate of advance in average living standards. After surging at an annual 2.6% rate from 1950 to 1973, productivity growth dropped to 1.4% from 1973 to 1995. Although the 1.2 percentage-point decline may seem trivial, compounded over time, it had enormous consequences. At the former rate, living standards would double every 28 years; at the latter rate, this doubling would take almost twice as long, or over 50 years. After 1995, the trend reversed again. What accounts for this reversal? Conventional economic wisdom has converged on the view that the "information technology revolution"—especially the rapidly falling prices of computer chips and the products in which they are

embedded—has been key. As measured by conventional statistics, there seems to be a lot of truth in this (Oliner & Sichel, 2002).

But a deeper change in the structure of the American economy itself—a decades-long transition from managerial to entrepreneurial capitalism—also seems to have played an important role in the acceleration of productivity growth. This transition was perhaps first articulated by Acs (1984), in saying that new markets, new technology, and entrepreneurship were at the heart of a transition from managerial to entrepreneurial capitalism. The full flowering of this process has recently been retold by David Audretsch (2007) and Carl Schramm (2006). Acs, Audretsch, and Schramm all push back against the notion of a managed economy.

Both Audretsch and Schramm describe the managed economy of the 1950s in detail, carefully documenting the interaction between labor, big business, and government. In a remarkable way, both Audretsch and Schramm come to similar conclusions about the nature of the new American society. However, they do not see its future in the same way. Audretsch believes that the rest of the world learned from the American model, thereby threatening its own comparative advantage. He notes (2007, p. 192),

> America had in ten years transformed itself from a self-doubting society to one of self-celebration. America had it, and the rest of the world did not. . . Having spent considerable time in Europe and Asia observing recent efforts to create their versions of an entrepreneurial society, I wondered, 'What will the United States do when the rest of the world catches up?'

Carl Schramm has an answer for Audretsch: Far from fearing an entrepreneurial transformation around the globe, the future of the American experiment actually depends on the rest of the world emulating it!

> For the United States to continue its global leadership, it must help the world see clearly the breadth and depth of our economic evolution. . . It is in America's interest to see our system replicated all over the world. We must believe that in flourishing entrepreneurial economies the widening distribution of wealth and the creation of new jobs will naturally help lead to the spread of democracy. . . *It is imperative that we—everyone everywhere—go into this entrepreneurial future together.* (Schramm, 2006, p. 176, emphasis added)

Entrepreneurial capitalism differs from managerial capitalism in several respects:

- Firm structure is more dynamic. Following World War Two, the U.S. economy was dominated by large firms, often in oligopolies (industries characterized by only a few firms). Turnover among the largest firms in the economy was limited; new firms played a minor role. In the last several decades, this has changed dramatically. New firms offering new products and services—in information technology, biotechnology, retailing, and foreign entrants in the traditional industries (e.g., car-making and steel)—have been a main, if not *the* main, drivers of economic growth.
- Markets and ecosystems are replacing bureaucracies (inside and outside the private sector). A hallmark of entrepreneurial firms is that they have relatively flat management structures that can rapidly change direction in response to market demands, in contrast to large firms, where management is hierarchal, more bureaucratic, and decision-making takes longer. In the managerial

economy, there was an implicit compact between "big labor, big business and big government" (Galbraith, 1952). That compact, if it ever existed, is clearly now gone. Labor's share of the workforce has fallen dramatically, big business is in flux (with constant changes in the rankings of America's leading firms), and government at all sectors is increasingly contracted out to the private sector.

- *Multisided markets* are replacing many traditional markets in the economy. Multisided markets or platforms are companies that help different groups of users find each other. Multisided platforms create value by reducing transaction costs and making markets more efficient. They also raise several *sorts of issues in antitrust, competition, and regulation.*
- Innovation is very different in managerial and entrepreneurial settings. New firms, led by risk-taking entrepreneurs, are disproportionately responsible for *radical* or *breakthrough* technologies, although larger, managerial firms are typically needed to refine, mass-produce, and market these breakthroughs. The innovations that now characterize contemporary life—the automobile, the telephone, the airplane, air conditioning, the personal computer, most computer software, and search engines for the internet—were all developed and commercialized by entrepreneurs. Because radical innovations tend to lead to faster overall growth than incremental improvements, it is no coincidence that the IT revolution—which has accounted statistically for the significant acceleration in U.S. productivity growth over the last decade—was largely sparked by entrepreneurial companies.
- Along with innovation, there was the revolution in information and communications technologies. The digital revolution began in the 1950s with the invention of the transistor and the microprocessor in the 1970s helped shape and transform the way much of the world works.

Over the years, the United States has developed laws and institutions that, for the most part, effectively encourage entrepreneurship. These laws and institutions include a legal system that protects rights of contract and property (including intellectual property); state and local registration systems that make it easy to start a business; a tax system that has generally moved to lower marginal tax rates (thus enhancing rewards from both employment and entrepreneurial activity); and laws to facilitate the growth of a financial system that generally backs the formation and growth of new ventures (Schramm, 2004).

Two different but related questions are important: What should entrepreneurship policy look like? and What does policy look like in an entrepreneurial economy?

For much of the managerial economy's existence, governments supported the small and medium sector of the economy. However, this was largely to promote democracy, not efficiency. In other words, SME policy was less about productivity growth and more about political pluralism (Ács & Audretsch, 2002).

During the 1990s, a string of initiatives focused attention on individuals instead of firms. The first careful treatment of the distinction between SME policy and entrepreneurship policy was by Lundstrom and Stevenson (2005). However, this all misses an essential point: There is *no such thing* as entrepreneurship policy per se,

only policy in an entrepreneurial economy. This overarching view was the subject of a Kauffman Foundation policy paper, *Roadmap for an Entrepreneurial Economy* (Kauffman, 2006), which included one key question: "How can policies makers maintain, and ideally accelerate, the continuing transition toward a more entrepreneurial economy?"

The world is now undergoing a global transformation. The evidence seems to support Hobijn and Jovanovic's (2001) conjecture that new firms were needed to introduce at least certain new technologies. Of the 167 publicly traded companies that make up the DPE, 86% were startups. Whereas during the 1970s, a mix of old and new firms introduced microprocessors, the key breakthroughs came from Intel and AMD, which were both started in 1968. By the 1980s, the computer industry was dominated again by old and new firms, but the gap had narrowed. During the 1990s, with the introduction of the internet and search engines, almost all the firms were startups. While the United States and Asia followed the Jovanovic model of relying on a mix of old and new firms, Europe rejected the importance of new firms and focused on knowledge-creation and existing firms. By looking to evidence of the platform economy, it is possible to better understand this evolution internationally and historically (Acs et al., 2021a, b).

3 The Platform Economy[9]

Song (2019) further refined the DEE framework and expanded it to multisided platforms. The concept of multisided platforms includes innovation platforms, transaction platforms, and hybrid platforms. Multisided platforms function as a digital marketplace, lowering five economic costs—search costs, replication costs, transportation costs, tracking costs, verification costs (Goldfarb & Tucker, 2019). Expanding the DEE framework from digital markets to platforms brings platform strategy to life and makes the connection between the platform organization's ecosystem and its value creation. The new configuration consists of: (1) Digital User Citizenship (DUC), which includes users on the demand-side *and* the supply-side; (2) Digital Technology Entrepreneurship (DTE), which includes app developers and various agents that contribute to entrepreneurial innovation, experimentation, and value creation on platforms; (3) Digital Multisided Platforms (DMP), which orchestrate social and economic activities between users and agents; and (4) Digital Infrastructure Governance (DIG), which pertains to all the regulations that govern the technical, social, and economic activities of digital infrastructure.[10]

The DPE Index lets us examine several key aspects of the platform economy in an integrated framework (Acs et al., 2021a, b). First and foremost, this means the new

[9]This section draws heavily on the Digital Platform Economy Index (Acs et al. 2021a, b).

[10]Nambisan (2017), Nambisan et al. (2018), and Sahut et al. (2021).

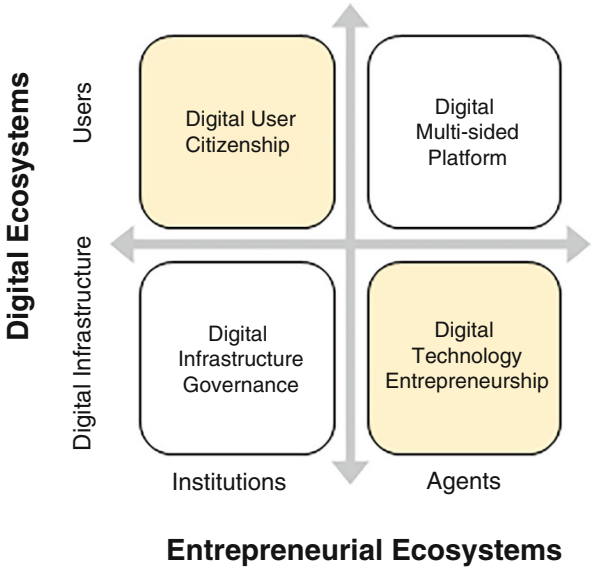

Fig. 1 The digital entrepreneurial ecosystem. Sections shaded in yellow are the two biotic entities, namely, digital users and agents

organizational form of the platform organization. The platform organization pulls together two sets of agents to create value. First, entrepreneurs innovate to build the technological core of platform companies. This is where the costs are. Second, users on both the demand and supply side form the other side of platform companies, where the money is. A thin layer represents the organizational and strategic part of the platform. The framework allows us to understand how both sets of agents are important and needed to create value in the platform economy.

The second aspect of the framework is infrastructure governance, without which the platforms could not operate. Digital infrastructure governance represents the technology of the digital age, along with the rules and regulations that govern its use through the nation-state. This technological infrastructure is crucial to the smooth working of the platform economy. It is also necessary for users and entrepreneurs to connect to platforms to be able to create the technological core of the platform. At its most basic level, it is the nation-state that is responsible for the smooth functioning of the platform economy.

Finally, the DPE framework allows us to examine the performance of economies and to compare why some countries do better than others and what policies can be used to improve platform performance. The DPE Index examines the interconnection of the four sub-indices of the platform economy through 12 pillars.

The two shaded areas in Fig. 1 represent the digital entrepreneurial ecosystem. Digital User Citizenship consists broadly of consumers (the demand side) and producers (the supply side) that are proficient in platform usage. Digital users connect to each other for economic and social activities through the internet and mobile devices on various digital platforms. The diffusion rates of these technologies attest to their utility and to users' willingness to adopt them. Online participation thus

requires a certain level of digital trust (e.g., user privacy) and digital proficiency (e.g., writing code, writing a movie review, rating a restaurant). Users should abide by the civic norms of the digital space and be discouraged from cybercrime (Terranova, 2000).

Digital technology entrepreneurs are third-party agents that partake in experimentation, innovation, and value creation and use hardware and software to build products that connect to innovation platforms, such as the Internet of Things (IoT). This reconfiguration combines technological entrepreneurship and digital entrepreneurship (Giones & Brem, 2017). The answer to the policy question in the previous section on accelerating the transition to a more entrepreneurial society is in part found in Lafuente et al. (2021). The authors employ a 'benefit of the doubt' approach to evaluate the entrepreneurial ecosystem. By examining the relative efficiency of countries' entrepreneurial ecosystem, the proposed analysis allows the computation of endogenous country specific weights that can be used for developing more informed policymaking. By analyzing the variation in economic and entrepreneurship outcomes over the seven-year period they found a significant correlation between quality improvements in the entrepreneurial ecosystem and venture capital investments.

3.1 Europe vs the World

The DPE Index allows us to examine European Entrepreneurial Ecosystem. Four conclusions can be drawn from Table 1, relating to the digital entrepreneurial ecosystem. First, the United States, the United Kingdom, and the Netherlands are virtually tied for first place. Second, Europe—especially its large countries, Germany, France, Italy, and Spain—is clearly in second place as a follower, not a leader. The Scandinavian countries, Sweden, Norway, Denmark, and Finland, as well as Switzerland, are stronger than the larger European countries. https://www.netzoekonom.de/plattform-oekonomie/ However, they are small in terms of population and output. Third, Asia is not really stronger than the European countries of Germany, France, Spain and Italy, which, however, lag behind the leaders. Fourth, China and India lag way behind the rest of Asia and Europe. Even if we account for measurement issues in large countries, the rankings are very helpful at the country level. The rest of the world tracks alongside other major indicators, including but not limited to the Global Entrepreneurship Index, the Ease of Doing Business, the Index of Economic Freedom, and the Human Development Index.[11]

Although the DPE score is useful to evaluate the digital entrepreneurship ecosystem of a country in comparison with other countries, this explains nothing about the strengths and weaknesses of any given country, for which the DPE Index must be

[11] The Ease of Doing Business has been discontinued by the World Bank. https://www.worldbank.org/en/news/statement/2021/09/16/world-bank-group-to-discontinue-doing-business-report

Table 1 DPE ranking of the countries, 2019

Rank	Country	DPE 2020	GDP 2017	Rank	Country	DPE 2020	GDP 2017	Rank	Country	DPE 2020	GDP 2017
1	United States	84.8	53445	40	Chile	38.4	22707	79	Ecuador	21.3	10424
2	United Kingdom	82.4	39255	41	Hungary	38.3	25664	80	Tunisia	21.0	10752
3	Netherlands	82.2	47270	42	Uruguay	36.2	20047	81	Albania	20.5	11359
4	Canada	78.2	43114	43	Greece	35.9	24224	82	Vietnam	20.3	5838
5	Sweden	76.6	46568	44	Bulgaria	35.0	17795	83	Jamaica	19.7	8180
6	Switzerland	76.1	57428	45	Croatia	34.7	21528	84	Iran	19.5	18498
7	Norway	74.1	64140	46	Costa Rica	34.3	15401	85	Egypt	19.5	10319
8	Denmark	71.1	45991	47	Romania	32.9	21615	86	Botswana	19.4	15723
9	Australia	69.3	44261	48	Russia	32.6	24417	87	Dominican Republic	19.4	14099
10	Finland	68.9	39522	49	Turkey	32.2	23756	88	Sri Lanka	18.2	11639
11	Ireland	66.0	63301	50	Mauritius	31.9	19567	89	Lebanon	17.6	13268
12	Luxembourg	65.5	94921	51	Brazil	31.2	14024	90	Namibia	17.5	9852
13	New Zealand	65.1	35268	52	Argentina	30.3	18489	91	Kenya	17.4	2926
14	Germany	64.3	44357	53	Mexico	29.4	16832	92	Mongolia	17.3	11361
15	France	63.5	38061	54	Ukraine	29.2	7668	93	El Salvador	16.4	7990
16	Iceland	62.6	45116	55	Saudi Arabia	29.2	50458	94	Paraguay	15.6	8871
17	Belgium	62.5	42095	56	Oman	28.7	40139	95	Guatemala	14.7	7367
18	Estonia	59.9	28110	57	Montenegro	28.4	15737	96	Senegal	14.3	2379
19	Hong Kong	58.4	54354	58	China	28.1	14399	97	Pakistan	14.0	4855
20	Austria	57.0	44439	59	Colombia	28.0	13124	98	Honduras	13.7	4392
21	Japan	56.8	38252	60	Panama	27.9	21335	99	Nigeria	13.7	5435
22	Korea	56.3	34986	61	Bahrain	27.6	43926	100	Zambia	13.4	3647
23	Israel	56.1	32688	62	Serbia	27.5	13721	101	Algeria	12.5	13921
24	Singapore	55.6	81443	63	Thailand	27.2	15683	102	Rwanda	11.9	1774

25	Spain	53.3	33320	64	Georgia	26.4	9277	103	Nepal	11.6	2298
26	Malta	53.2	35705	65	South Africa	26.4	12237	104	Kyrgyzstan	11.5	3294
27	Portugal	50.7	27103	66	Jordan	25.1	8390	105	Bangladesh	11.2	3319
28	Czech Republic	48.9	31339	67	Armenia	25.0	8190	106	Uganda	11.0	1687
29	Taiwan	47.0	49901	68	Macedonia	24.5	13055	107	Cameroon	10.8	3347
30	Italy	46.1	34700	69	Philippines	24.4	7236	108	Mali	10.2	1971
31	Slovenia	45.0	29930	70	Moldova	24.3	4944	109	Zimbabwe	10.0	1880
32	Lithuania	44.3	27944	71	Morocco	24.3	7286	110	Cambodia	9.8	3465
33	Cyprus	44.3	31331	72	Azerbaijan	23.9	16001	111	Tanzania	9.8	2584
34	United Arab Emirates	43.0	67133	73	India	23.8	6093	112	Malawi	9.6	1084
35	Latvia	42.8	23729	74	Peru	23.6	12072	113	Benin	9.5	2010
36	Malaysia	42.0	25669	75	Kazakhstan	23.5	23447	114	Madagascar	7.2	1397
37	Qatar	40.6	118207	76	Indonesia	23.2	10765	115	Burundi	6.8	721
38	Poland	40.5	26036	77	Kuwait	21.7	68862	116	Ethiopia	6.0	1608
39	Slovakia	40.4	29212	78	Bosnia and Herzegovina	21.5	11327				

DPE Index score, European Union countries are denoted by a light blue color; the per capita GDP of the country is in purchasing power parity. Source: the World Bank (2017)

Source: Acs, Z. J., Szerb, L., Song, A., Komlosi, E., Lafuente, E. (2021b). *The Digital Platform Economy Index: 2020,* The GEDI Institute, www.thegedi.org

broken down into its components. As seen in Table 2, the United Kingdom, the United States, and the Netherlands are strong in all four areas: governance, citizenship, platforms, and entrepreneurship. It is also clear that the large European countries are in a secondary position in all four areas. For example, Germany (in 14th position overall) ranks 23rd in platforms, behind France in 16th. Spain ranks 25th in three out of four areas and Italy is not even listed in the top 25 overall, occupying 30th position.

Table 2 also highlights that the United States leads in the digital multisided platform (DMSP) and digital technology entrepreneurship (DTE) sub-indices, but ranks third in digital user citizenship (DUC) and in digital infrastructure governance (DIG). The best sub-index score for the United States is 92.2 (DTE) and its worst is 79.0 (DUC). The United Kingdom's performance is also well-balanced, ranging from 1st (DUC, 83.5) to 4th (DIG, 80.1). Some countries show even higher variations. For example, Australia, ranked ninth overall, is fourth in DUC (77.3) but only 18th in DTE (56.9).

3.2 European Countries

Examining the global results initially helps to isolate the position of E.U. member countries. These results then show that the United Kingdom outperforms most other countries in the world. In fact, it is on par with the United States in terms of institutions, agents, digital infrastructure, and users. Large E.U. countries—Germany, France, Spain, and Italy—lag significantly behind. The argument of this chapter is that one benefit of the United Kingdom leaving the European Union is that the Union was probably holding it back through regulation. London is the world's leading center of knowledge-creation, human capital, financial capital, and entrepreneurial talent.

As Fig. 2 highlights, there is a close connection between per-capita GDP and DPE scores: The Pearson correlation coefficient is 0.66, without the oil-rich countries, and countries with higher than Int$65,000 per capita GDP. The third-degree trend line shows even closer connection, as pictured in Fig. 2.

The third-degree adjusted curve in Fig. 2 explains around 90% of the variation between per capita GDP and DPE. Examining a particular country's position, whether below or above the development-implied trend line, is more appropriate than simply comparing countries at different stages of development. For example, the United States has the highest DPE score, 84.8, and is above the trend line, as are the United Kingdom and the Netherlands. Germany, France, Spain, and Italy all have lower DPE scores and are on or below the trend line. Eastern European countries have much lower scores still.

Table 2 The four sub-index scores and ranking of the first 25 countries

DPE ranking	Country	Digital infrastructure governance score	Digital infrastructure governance ranking	Digital user citizenship score	Digital user citizenship ranking	Digital multi-sided platform score	Digital multi-sided platform ranking	Digital technology entrepreneurship score	Digital technology entrepreneurship ranking	Digital entrepreneurship ecosystem index	Ranking
1	United States	80.7	3	79.0	3	87.4	1	92.2	1	84.8	1
2	United Kingdom	80.1	4	83.5	1	84.8	3	81.3	3	82.4	2
3	Netherlands	89.5	1	74.3	7	86.3	2	78.6	4	82.2	3
4	Canada	75.4	8	81.3	2	78.8	5	77.1	5	78.2	4
5	Sweden	78.3	5	74.2	8	79.5	4	74.3	6	76.6	5
6	Switzerland	75.5	7	74.6	6	69.3	9	84.8	2	76.1	6
7	Norway	84.4	2	75.0	5	73.5	6	63.7	12	74.1	7
8	Denmark	78.2	6	68.4	11	73.3	7	64.3	11	71.1	8
9	Australia	73.7	9	77.3	4	69.2	10	56.9	18	69.3	9
10	Finland	71.5	11	70.9	9	67.1	11	66.0	8	68.9	10
11	Ireland	66.0	15	63.2	17	65.3	14	69.5	7	66.0	11
12	Luxembourg	73.6	10	65.5	14	60.3	17	62.9	14	65.5	12
13	New Zealand	69.4	13	66.0	13	70.3	8	54.9	23	65.1	13
14	Germany	67.6	14	70.3	10	56.3	23	63.1	13	64.3	14
15	France	63.5	18	64.9	15	60.3	16	65.3	9	63.5	15
16	Iceland	70.7	12	48.7	28	65.6	13	65.3	10	62.6	16
17	Belgium	65.8	16	59.8	18	64.9	15	59.5	17	62.5	17
18	Estonia	63.1	19	64.0	16	57.4	22	55.1	21	59.9	18
19	Hong Kong	62.0	20	56.1	20	58.7	20	56.9	19	58.4	19
20	Austria	63.7	17	57.6	19	50.0	28	56.6	20	57.0	20
21	Japan	61.0	21	68.2	12	44.2	34	53.7	24	56.8	21
22	Korea	57.9	22	54.6	22	59.5	18	53.2	26	56.3	22
23	Israel	48.2	31	48.5	29	66.9	12	60.9	16	56.1	23
24	Singapore	55.1	24	47.7	30	58.5	21	61.2	15	55.6	24
25	Spain	54.0	25	53.1	23	52.5	25	53.7	25	53.3	25

(continued)

Table 2 (continued)

DPE ranking	Country	Digital infrastructure governance score	Digital infrastructure governance ranking	Digital user citizenship score	Digital user citizenship ranking	Digital multi-sided platform score	Digital multi-sided platform ranking	Digital technology entrepreneurship score	Digital technology entrepreneurship ranking	Digital entrepreneurship ecosystem index	Ranking
26	Malta	55.3	23	43.3	34	59.3	19	55.1	22	53.2	26
27	Portugal	51.0	27	50.6	26	50.5	27	50.7	27	50.7	27
28	Czech Republic	51.6	26	54.9	21	45.8	32	43.1	31	48.9	28
29	Taiwan	49.0	30	51.3	25	54.0	24	33.6	48	47.0	29
30	Italy	40.7	41	50.3	27	46.1	31	47.3	28	46.1	30
31	Slovenia	49.2	29	45.8	31	42.7	37	42.3	32	45.0	31
32	Lithuania	47.1	32	45.5	32	46.2	30	38.3	35	44.3	32
33	Cyprus	50.1	28	37.1	39	43.5	36	46.3	29	44.3	33
34	United Arab Emirates	43.1	35	33.3	48	50.5	26	45.2	30	43.0	34
35	Latvia	46.7	33	41.9	36	44.6	33	38.0	36	42.8	35
36	Malaysia	42.0	38	41.5	37	44.0	35	40.5	33	42.0	36
37	Qatar	42.3	37	36.4	40	46.8	29	37.0	38	40.6	37
38	Poland	42.4	36	42.3	35	40.6	39	36.6	41	40.5	38
39	Slovakia	43.5	34	44.0	33	38.8	40	35.3	43	40.4	39
40	Chile	36.7	44	38.7	38	41.3	38	36.8	39	38.4	40
41	Hungary	41.8	39	35.9	42	38.0	41	37.8	37	38.3	41
42	Uruguay	29.8	56	51.9	24	32.4	48	30.7	55	36.2	42
43	Greece	37.7	42	35.4	44	31.7	50	38.8	34	35.9	43
44	Bulgaria	36.8	43	33.6	46	34.8	45	34.8	46	35.0	44
45	Croatia	41.4	40	34.7	45	33.9	46	29.0	62	34.7	45
46	Costa Rica	35.3	47	36.0	41	30.7	53	35.0	45	34.3	46
47	Romania	35.4	46	35.7	43	29.8	56	30.7	56	32.9	47
48	Russia	24.8	69	31.3	53	37.9	42	36.3	42	32.6	48
49	Turkey	33.2	50	27.5	59	35.4	44	32.7	49	32.2	49

50	Mauritius	35.9	45	33.4	47	28.5	61	29.6	60	31.9	50
51	Brazil	29.5	58	27.9	57	36.4	43	31.2	53	31.2	51
52	Argentina	31.8	51	33.1	49	28.4	62	28.0	65	30.3	52
53	Mexico	31.5	52	31.5	52	26.3	65	28.1	64	29.4	53
54	Ukraine	23.1	72	26.9	62	30.3	54	36.6	40	29.2	54
55	Saudi Arabia	28.1	63	22.8	73	30.9	52	35.1	44	29.2	55
56	Oman	33.3	49	31.8	51	29.2	58	20.5	81	28.7	56
57	Montenegro	28.6	60	26.6	63	26.7	64	31.8	50	28.4	57
58	China	19.2	83	28.4	55	29.9	55	34.8	47	28.1	58
59	Colombia	31.5	53	27.5	60	26.0	66	27.1	67	28.0	59
60	Panama	29.5	57	28.3	56	23.7	74	30.2	58	27.9	60
61	Bahrain	34.2	48	12.6	107	33.3	47	30.4	57	27.6	61
62	Serbia	27.7	64	28.7	54	28.8	60	24.7	71	27.5	62
63	Thailand	22.1	76	25.3	64	32.2	49	29.2	61	27.2	63
64	Georgia	26.2	67	32.2	50	25.2	70	22.2	75	26.4	64
65	South Africa	28.5	61	23.7	70	25.3	69	28.1	63	26.4	65
66	Jordan	22.7	73	22.5	75	23.7	73	31.5	52	25.1	66
67	Armenia	24.3	70	19.4	83	25.4	68	30.8	54	25.0	67
68	Macedonia	26.7	66	22.8	72	31.2	51	17.3	93	24.5	68
69	Philippines	22.5	74	22.8	74	24.8	71	27.3	66	24.4	69
70	Moldova	26.8	65	27.5	58	21.0	80	22.0	77	24.3	70
71	Morocco	30.0	55	21.8	78	25.6	67	19.9	84	24.3	71
72	Azerbaijan	25.3	68	27.1	61	17.1	89	26.1	68	23.9	72
73	India	19.8	80	23.1	71	20.8	81	31.7	51	23.8	73
74	Peru	24.3	71	24.5	65	20.4	82	25.3	70	23.6	74
75	Kazakhstan	28.2	62	24.3	67	20.2	83	21.4	78	23.5	75
76	Indonesia	18.6	84	19.9	81	24.7	72	29.6	59	23.2	76
77	Kuwait	19.6	81	13.9	100	27.8	63	25.6	69	21.7	77
78	Bosnia and Herzegovina	29.4	59	18.7	85	21.3	79	16.6	97	21.5	78
79	Ecuador	22.2	75	24.3	66	18.7	87	20.0	83	21.3	79
80	Tunisia	19.2	82	22.1	76	20.2	84	22.6	74	21.0	80

(continued)

Table 2 (continued)

DPE ranking	Country	Digital infrastructure governance score	Digital infrastructure governance ranking	Digital user citizenship score	Digital user citizenship ranking	Digital multi-sided platform score	Digital multi-sided platform ranking	Digital technology entrepreneurship score	Digital technology entrepreneurship ranking	Digital entrepreneurship ecosystem index	Ranking
81	Albania	21.3	78	20.2	80	21.5	78	19.1	87	20.5	81
82	Vietnam	12.3	91	18.0	86	29.8	57	21.2	79	20.3	82
83	Jamaica	18.2	85	20.7	79	22.4	76	17.5	91	19.7	83
84	Iran	10.6	97	16.5	91	28.8	59	22.1	76	19.5	84
85	Egypt	20.4	79	17.6	88	16.9	90	23.1	73	19.5	85
86	Botswana	21.6	77	21.9	77	15.8	93	18.4	90	19.4	86
87	Dominican Republic	30.9	54	14.6	98	16.1	92	16.0	99	19.4	87
88	Sri Lanka	9.1	100	16.7	90	23.3	75	23.7	72	18.2	88
89	Lebanon	5.6	111	24.1	68	20.1	85	20.8	80	17.6	89
90	Namibia	6.2	110	23.8	69	19.5	86	20.3	82	17.5	90
91	Kenya	16.0	86	17.5	89	16.6	91	19.8	86	17.4	91
92	Mongolia	7.5	104	19.9	82	21.9	77	19.9	85	17.3	92
93	El Salvador	15.5	87	16.1	94	17.4	88	16.8	95	16.4	93
94	Paraguay	15.0	88	17.7	87	13.3	96	16.4	98	15.6	94
95	Guatemala	10.7	96	16.4	92	15.0	94	16.7	96	14.7	95
96	Senegal	13.8	89	18.9	84	9.7	105	14.7	102	14.3	96
97	Pakistan	12.8	90	12.3	108	13.3	97	17.5	92	14.0	97
98	Honduras	10.8	95	15.0	96	13.9	95	15.2	101	13.7	98
99	Nigeria	11.6	93	12.6	106	12.0	98	18.5	89	13.7	99
100	Zambia	12.2	92	16.4	93	11.0	101	14.0	104	13.4	100
101	Algeria	11.1	94	12.9	104	10.3	104	15.6	100	12.5	101
102	Rwanda	7.3	105	13.5	102	7.6	111	19.0	88	11.9	102
103	Nepal	8.0	102	14.3	99	12.0	99	12.0	110	11.6	103
104	Kyrgyzstan	10.4	99	9.7	113	11.8	100	14.1	103	11.5	104
105	Bangladesh	10.4	98	9.6	114	10.9	102	13.8	106	11.2	105

106	Uganda	7.3	106	11.5	110	8.3	110	16.9	94	11.0	106
107	Cameroon	8.3	101	15.3	95	9.5	107	10.1	113	10.8	107
108	Mali	6.4	109	14.8	97	5.8	113	13.8	105	10.2	108
109	Zimbabwe	6.9	108	12.1	109	8.7	109	12.4	108	10.0	109
110	Cambodia	5.5	112	11.2	111	10.4	103	12.2	109	9.8	110
111	Tanzania	7.2	107	12.9	105	9.5	106	9.5	115	9.8	111
112	Malawi	8.0	103	13.7	101	5.1	115	11.8	111	9.6	112
113	Benin	5.0	114	13.2	103	9.5	108	10.5	112	9.5	113
114	Madagascar	4.4	115	5.1	116	6.4	112	12.9	107	7.2	114
115	Burundi	5.3	113	10.4	112	2.3	116	9.2	116	6.8	115
116	Ethiopia	0.7	116	8.3	115	5.4	114	9.5	114	6.0	116
										36.2	

Source: Acs, Z. J., Szerb, L., Song, A., Komlosi, E., Lafuente, E. (2021b). *The Digital Platform Economy Index: 2020,* The GEDI Institute, www.thegedi.org

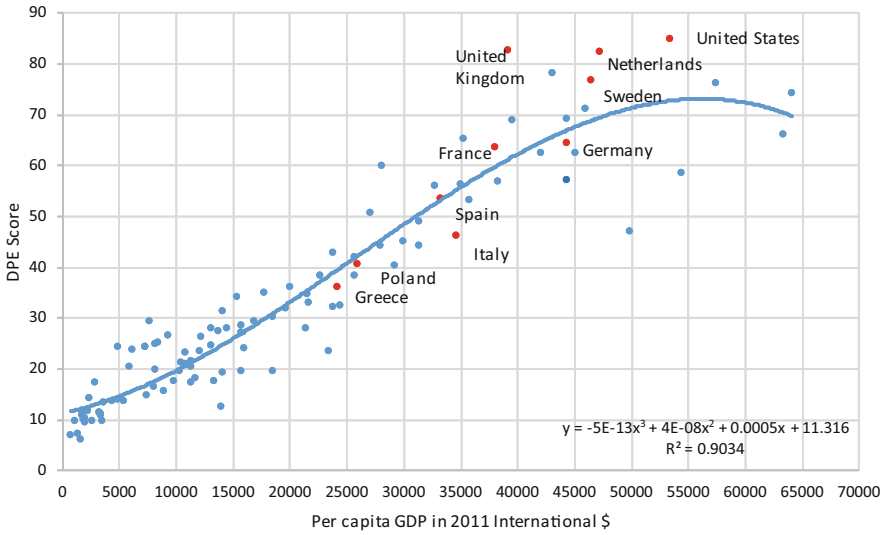

Fig. 2 The connection between the DPE Index and per capita GDP (development). Source: Acs, Z. J., Szerb, L., Song, A., Komlosi, E., Lafuente, E. (2021b). *The Digital Platform Economy Index: 2020,* The GEDI Institute, www.thegedi.org

3.3 The United Kingdom and Germany

The defining issue confronting the European Union for the past few years has been Brexit: The United Kingdom leaving the Union after 40 years. This is an issue of formation in the economy. Why the United Kingdom decided to leave the European Union has been studied extensively, with different scholars looking at immigration, a dysfunctional economy, regulation, the rule of law, and cultural differences. We can identify three major areas of concern: the economy, sovereignty, and culture.

The economic concern has been partly about the European Union as a dysfunctional economic entity. Innovation, entrepreneurship, trade, and employment policies have led to large disparities in Europe between the rich north and the much poorer south. Staying in the European Union would have pulled the United Kingdom down to the European level. The United Kingdom would not be able to realize its economic potential within a dysfunctional E.U. bureaucracy. According to Gramm and Toomey (2020), "Britain is leaving the European Union, which has trampled on British sovereignty, to escape its crippling regulatory structure."

The second issue was the rise of nationalism around the world and the distrust of international organizations to deal with global problems like security, trade, finance, inequality, and immigration. The sovereignty issue revolves around questions of whether a country should live under the rules of an international organization like the European Union, or national rules. With the European Union tightening its grip on all member states, the United Kingdom had limited freedom to enact its own laws and regulations.

Table 3 The four sub-indices of selected E.U. countries, the United Kingdom, and the United States

	Digital infrastructure governance	Digital user citizenship	Digital multisided platform	Digital technology entrepreneurship
France	63.5	64.9	60.3	65.3
Germany	67.6	70.3	**56.3**	**63.1**
Italy	40.7	50.3	**46.1**	**47.3**
Spain	54.0	53.1	52.5	53.7
United Kingdom	**80.1**	83.5	84.8	**81.3**
United States	**80.7**	79.0	87.4	**92.2**

Source: Acs, Z. J., Szerb, L., Song, A., Komlosi, E., Lafuente, E. (2021b). *The Digital Platform Economy Index: 2020,* The GEDI Institute, www.thegedi.org
Strengths and weaknesses in the EU are indicated in bold

The final issue is cultural and revolves around national identity and nationalism, which includes but is not limited to issues of immigration and religion, and their impact on cultural identity. Young people that voted against Brexit were influenced by cultural diversity and their lifestyle as full-time students. No relationship was found with education (Ehsan & Sloam, 2020).

The question remains: Why did Britain vote for Brexit? Looking at an individual level analysis Clarke et al. (2017) found that both the economic influence and immigration-terrorism cost-benefit factors played a very significant role in explaining the vote to leave. However, what has not been carefully researched is what aspect of economic influence was important? Was it innovation, technology, entrepreneurship, type of industry, or human capital? What the DPE shows is that the United Kingdom has a rather strong twenty-first-century digital entrepreneurial ecosystem but was stuck in a dysfunctional twentieth-century European Union bureaucracy. Looking at the scores of the DPE's four determinants, the United Kingdom is almost identical to the United States (Table 3). In other words, the four determinants are almost identical. Germany, Italy, and France lag far behind. If we look at the four determinants, the biggest differences are in agency. One interpretation of this is that the United Kingdom has a very strong DEE, which was tied into the rulemaking structure of the European Union, which is itself amended to a twentieth-century version of the twenty-first century. If the United Kingdom was to realize its economic potential, it had to extricate itself from the European Union. London is the home of the largest knowledge base in the world, hosting six of the top twenty universities in the world, the largest financial center in the world along with New York City, and an increasingly entrepreneurial hub populated by globalized human capital. Therefore, the formation of the U.-K. economy has now been freed to focus on the economy of the twenty-first century.

Germany is a different story. While the United Kingdom is a leader in digital entrepreneurship, Germany is a follower. This weaker position is holding Germany back from fully embracing a digital future. For Germany as the engine of Europe, the

lack of startups is a hindrance, especially in the area of information and digital technologies. The auto industry shows clearly that existing firms will not introduce new technologies, and the entry of Tesla into Berlin (the information capital of Europe) is a shot across the bow of the European auto empire.

The German auto industry dominates the world in many respects, from the mass market to the luxury market, and even the racing world. If we apply the Jovanovic analysis to the German auto industry, we can understand the likelihood of the industry implementing new technologies. The industry would focus on product improvement, which would give it cars that were, in a sense, over-engineered. Hobijn and Jovanovic (2001) suggested that new technologies will not be implemented by existing firms because of awareness and skill; vintage capital; and vested interests. The German auto industry fits this analysis like a glove. The industry is heavily invested in skills in the metal industry, engines transmissions, suspension, and steering, but there is a shortage of computer skills. Second, the huge investment in vintage capital prevents it from easily writing this investment off. Finally, the heavy investment in the governance of codetermination between labor business and government work councils makes meaningful restructuring almost impossible. This structure is reinforced by the top-down rules of the European Union.

Tesla's move to Berlin, arguably the digital capital of Europe, indicates that the future of the European auto industry may be with the startup and not the incumbent. Electric cars and self-driving vehicles are already here; they are just not necessarily evenly distributed. But the direction of change is clear and the only unknown is the rate of change. Once resource allocation decisions are redirected away from mechanical and diesel vehicles and toward electric vehicles that are cleaner and align with climate change priorities, the rate of change could accelerate very quickly (Monsellato, 2015).

A deeper analysis of Tesla's global growth provides greater insight into the specific advantages of the company's business model, and why entrepreneurs like Elon Musk choose to incorporate in the United States. It therefore shows what obstacles restrict German innovation and entrepreneurship. Tesla serves as an unprecedented case study because different government regulations have made entrance to the sector harder, since there are different standards in safety, emissions, and standards. Recent history has proved that besides Tesla Motors, no new player has entered the automotive industry in a significant manner in the last decades (Monsellato, 2015).

Indeed, Tesla has achieved what few previously thought possibly: turning profits on a premium-priced electronic vehicle (EV) with a developing supply chain that can potentially bring affordable and sustainable high-tech cars to the middle class. If successful, such a profitable and tech-driven business model would enable a domino effect in innovation among Musk's other companies, SpaceX and Solar City. Naturally, Tesla has utilized unconventional marketing to build its brand—a passion for transportation efficiency, high-tech adoption, and a sustainable footprint—and it has been noticed. Now, the Tesla Model S has earned numerous prizes like the Motor Trend Car of the Year 2013 and the World Green Car of the Year 2013 and

has chipped away at the market share of German luxury car makers (Monsellato, 2015). The great engineers at Tesla have fully embodied Schumpeterian entrepreneurship by identifying a need for EVs in the market, foreseeing the demand-desire and supply requirements, orchestrating a network of individuals with the knowledge and funds to create the new technology, and establishing strategic agreements with partners to scale commercialization and diversify output in the long run. Due to Tesla's high degree of vertical integration, location in Silicon Valley, status as the sole car maker in the western United States, and exceptional human capital—in addition to Musk's own credentials, he employs workers with backgrounds ranging from Ford to Cisco, Apple, Oracle, GM, and German car makers—the startup went from a niche concept shop to a global player with a successfully sustained stock price (Monsellato, 2015).[12]

4 Discussion

How do we interpret the evolution of the industrial structure and the rise of the digital platform economy? Political economy may have had a negative impact on economic policymaking regarding the ITR in the European Union. What do we mean by *political economy*? According to Brian Arthur (Root, 2020, p. xv),

> Economics before 1870 was concerned with two great problems. One was *allocation* within the economy: how quantities of goods and services and their prices are determined within and across markets or between trading countries. The other was *formation* within the economy: how an economy emerges and changes its structure over time. In the years since 1870, and the development of *neoclassical* economics. . . *allocation* came to constitute 'economic theory' itself.

Questions of formation thus faded from the central core of economic theory, and economics had little to say about adaption, adjustment, innovation, the formation of institutions, and structural change itself. The formation problem was not easily mathematized and was left to *political economists*, who restricted themselves to case studies and qualitative theories. This branch of economic theory was open to scholars from different persuasions, as the literature on National Systems of Innovation and Clusters, among others, demonstrates.[13]

How did the political economy approach gain a foothold in Europe? The short answer is that *neoclassical* economics never had a very strong footing in Europe. The longer answer lies in the Science Policy Research Unit (SPRU) at the University of Sussex. Here, some of the best minds in economics and innovation policy created a program with National Systems of Innovation and the role of the entrepreneurial state at its heart. This was built around the work of Richard Nelson and Sydney Winter in the 1980s on an evolutionary theory of economic growth. The theory

[12] I would like to thank Mathew Boyer for these insights into Tesla.

[13] See Root (2020).

assumed that innovation would take place in *existing firms*. At SPRU, a group of brilliant scholars including Richard Nelson, Christopher Freeman, Luc Soute, Giovani Dosi, Roy Rothwell, and David Rosenberg, among others, propagated a strong line of argument on the knowledge and firm question. There was no other group in Europe that had the intellectual firepower to counter this argument. Muzzucato, educated at the New School for Social Research in New York City, was a product of a European intellectual tradition that stressed the role of the state over the role of the individual. Systems thinking always put the system ahead of the individual.

Where among U.S. scholarly work do we find a larger emphasis on markets and entrepreneurship? The alternative set of arguments that developed in the United States came out of the old industrial organization literature and stressed the role of entry, startups, young firms, and new firms in bringing technology to market (Evans, 1989; Evans & Jovanovic, 1989). The literature on patents, technology, innovation, and productivity and the literature on finance—venture capital and angel investing—revolved around resource allocation. Here the key players were Michael Jensen, Eugene Fama, Josh Lerner, and Paul Gompers, among others. The ITR of the 1970s ushered in a wave of political, regulatory, and organizational change in the 1980s as countries around the world responded to the digital revolution (Jensen, 1993).

Why did the ITR favor new firms? The technology breakthroughs favored new firms for three reasons: awareness and skills; vintage capital; and vested interests (Hobijn & Jovanovic, 2001). First, managers of old firms may not have known what the new technologies offered or may have been unable to implement it. When IBM entered the PC market, it lacked the ability to quickly develop an operating system so it turned to Intel for its microprocessor and Microsoft for its operating system.

Second, the human and physical capital of old firms were tied to their current practices, so may not have easily converted to new technologies. Abandoning investment in old technologies may not have made sense. When the Berlin Wall fell, countries in Central Europe were reluctant to give up their vintage capital even in the face of far superior Western methods.[14] Unencumbered by the past, new firms had more incentive to invest in new technologies. When the biotechnology revolution took off in the 1970s, it was startups that introduced the new technologies. The human capital of existing pharmaceutical companies was in chemistry, while the biotechnology breakthroughs were in biology.

Third, workers and management in older firms, especially if they belonged to a union, may have resisted new technologies because they devalued their skills. In doing so, they may have harmed the interests of the firm and shareholders by reducing the firm's value. It appears this is exactly what happened in the European Union. The European Union protected traditional industries and hoped that existing firms would introduce new technologies. This was a policy designed to fail (Acs et al. 2021a, b).

[14] See Der Spiegel (2005).

As we have shown, the major theoretical underpinning of European economic policy postulated that *existing firms* would introduce the new technologies. How have these propositions influenced economic performance in the European Union as a whole and in the separate countries of the European Union? In one of the largest studies on the subject of Europe's entrepreneurial future (FIRES) Elert et al. (2019), p. 6) concluded the following:

> Overall, the data suggests that contemporary Europe has a comparatively less fertile 'ecosystem' for Schumpeterian/high-impact entrepreneurship than the USA, and in some respects even relative to China and East Asia. In Eastern Europe, much of the self-employment is marginal necessity-driven entrepreneurship, whereas in Western Europe the base of self-employment may be broad, but opportunities to grow into the global competitors of the future, in particular, seem limited.[15]

What has been the outcome of E.U. policy in limiting entrepreneurial activity over recent decades? It is immediately clear from Fig. 3 that the United States and China dominate the platform landscape. Based on the market value of top companies, the United States alone represents 66% of the world's platform economy with 41 of the top 100 companies. European platform-based companies play a marginal role, with only 3% of market value. Moreover, the distribution of the top 100 platform-based companies is uneven; the first 15 companies represent around 75% of the entire market value.

Of the 12 European platform-based companies, one is Norwegian, one Russian, two Dutch, two Swedish, three German, and three are in the United Kingdom. Just comparing platform-based ranking to the DPE Index ranking, the United Kingdom, the Netherlands, Sweden, and Norway are in the top ten, while Germany is 14th and Russia is 48th. It is immediately clear that a strong digital platform-based ecosystem alone is not enough to nurture multi-billion–dollar platform-based companies. Country size also seems to matter. The United Kingdom has now left the European Union, which has reduced the number of top platform-based companies in the European Union to nine, with only SAP among the top 15. Perhaps a more unified European Union will provide a more favorable environment for platform-based development.

5 Conclusion

In the hierarchical world of the twentieth century, giant firms and the state needed and relied on each other, especially after World War Two (Carter, 2020). The state needed corporations to create a growing and successful economy and corporations needed the state for market stability: labor markets, capital markets, financial markets, foreign exchange markets, and international markets. Both governments and corporations relied on hierarchical order. In this world, as Ferguson (2018)

[15] Also see Karlson et al. (2019).

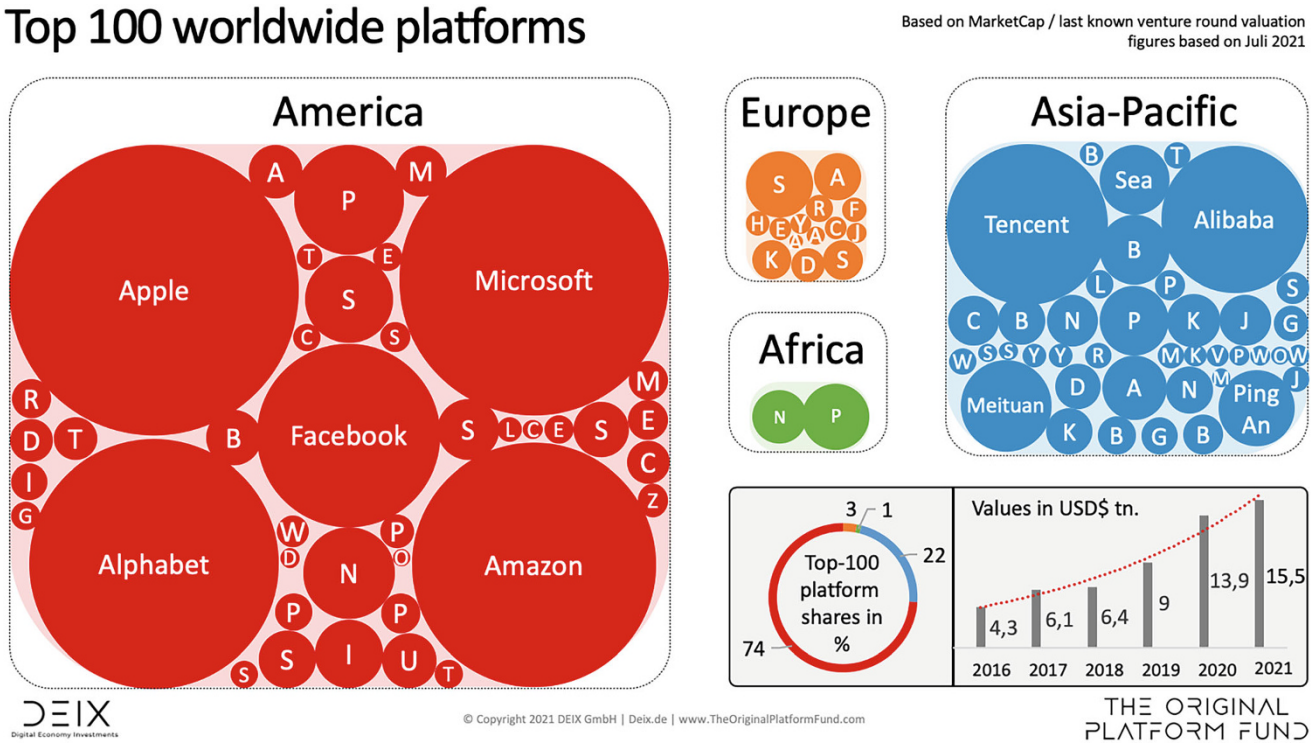

Fig. 3 The Top 100 Platform Companies around the World (July, 2021). Source: https://www.netzoekonom.de/plattform-oekonomie/Reprinted with permission

makes clear, "The tower represents hierarchy and the crucial incentive that favored hierarchical order was that it made the exercise of power more efficient." The symbiotic relationship between market and state is the greatest distinction between one government and another: the extent to which government replaces markets or markets replace government is not an *either–or*.

What has happened in the twenty-first century, according to Ferguson (2018) and others is that with the re-emergence of networks, the balance between state and market has shifted as hierarchy has been replaced with networks. The state has maintained its bureaucracy, but with little or nothing to manage, as networks are less concerned with power than hierarchies. This also explains why in the United States, the European Union, and China, the *political establishment* clings to power while society has mostly dismantled hierarchy in the private sector and the majority of the electorate is deeply alienated from the *political establishment*. The struggle is therefore now over liberty, with state and society in conflict over how to tame the despotic leviathan (Acemoglu & Robinson, 2019).[16]

In the digital age (Sachs, 2020) with the emergence of autonomous networks, the balance between state and market has shifted as networks have replaced hierarchies. The key research question for the twenty-first century concerns the governance structure of the digital age. This calls for the invention of more effective ways to govern an interdependent world. Future research should study the governance structure of the digital platform-based ecosystem with its billions of users and millions of entrepreneurs.

Acknowledgments This chapter grew out of a larger research project on systems of entrepreneurship and entrepreneurial ecosystems over the past decade at Imperial College and the London School of Economics. The project built on earlier work on National Systems of Entrepreneurship and The Global Entrepreneurship Index at the University of Pecs and George Mason University. The complete database and methodology are available from the authors upon request. I would like to thank Laszlo Szerb and two anonymous referees for helpful comments.

References

Acemoglu, D., & Robinson, J. A. (2019). *The narrow corridor: States, societies, and the fate of liberty*. Penguin UK.

Acs, Z. J. (1984). *The changing structure of the U. S. economy*. Praeger Publishers.

Acs, Z. J., & Audretsch, D. B. (1987). Innovation, market structure, & firm size. *Review of Economics & Statistics, 69*(4), 567.

Acs, Z. J., & Audretsch, D. B. (1988). Innovation in large & small firms: An empirical analysis. *American Economic Review, 78*(4), 678–690.

Ács, Z. J., & Audretsch, D. B. (1990). *Innovation and small firms*. MIT Press.

Ács, Z. J., & Audretsch, D. B. (2002). *Handbook of entrepreneurship research*. Kluwer Academic Publishers.

[16] https://www.washingtonpost.com/world/asia_pacific/china-crackdown-tech-celebrities-xi/2021/09/09/b4c2409c-0c66-11ec-a7c8-61bb7b3bf628_story.html

Acs, Z., Audretsch, D. B., & Feldman, M. (1992). Real effects of academic research: comment. *American Economic Review, 82*(1), 363–367.
Acs, Z., Audretsch, D. B., & Feldman, M. (1994). R & D spillovers and recipient firm size. *Review of Economics and Statistics, 76*(2), 336–340.
Acs, Z. J., Anselin, L., & Varga, A. (2002). Patents and innovation counts as measures of regional production of new knowledge. *Research Policy, 31*(7), 1069–1085.
Acs, Z. J., Braunerhjelm, P., Audretsch, D. B., & Carlsson, B. (2009). The knowledge spillover theory of entrepreneurship. *Small Business Economics, 32*(1), 15–30.
Acs, Z. J., Estrin, S., Mickiewicz, T., & Szerb, L. (2018). Entrepreneurship, institutional economics & economic growth: An ecosystem systems perspective. *Small Business Economics, 51*(2), 501–514.
Acs, Z., Song, A., Szerb, L., Audretsch, D., & Komlosi, E. (2021a). The evolution of the digital platform economy: 1971–2021. *Small Business Economics, 57*(2), 1–31.
Acs, Z. J., Szerb, L., Song, A., Komlosi, E., & Lafuente, E. (2021b). *The Digital Platform Economy Index: 2020*. The GEDI Institute. Retrieved from www.thegedi.org
Anselin, L., Varga, A., & Acs, Z. (1997). Local geographic spillovers between university research & high technology innovations. *Journal of Urban Economics, 42*(3), 422–448.
Audretsch, D. B. (1991). New-firm survival and the technological regime. *Review of Economics and Statistics, 73*(3), 441–450.
Audretsch, D. B. (1995). Innovation, growth & survival. *International Journal of Industrial Organization, 13*(4), 441–457.
Audretsch, D. B. (2007). *The entrepreneurial society*. Oxford University Press.
Audretsch, D. B., & Feldman, M. (1995). R&D spillovers and the geography of innovation and production. *American Economic Review, 86*(3), 630–640.
Berne, P. (2020, January 16). Alphabet becomes the fourth trillion dollar company. *Android Central*. Retrieved from androidcentral.com/alphabet-becomes-fourth-trillion-dollar-company
Birch, D. L. (1981). Who creates jobs? *The Public Interest, 65*, 3–14.
Carter, Z. (2020). *The price of peace: Money, democracy, & the life of John Maynard Keynes*. Random House.
Cavallo, A., Ghezzi, A., & Balocco, R. (2019). Entrepreneurial ecosystem research: Present debates and future directions. *International Entrepreneurship & Management Journal, 15*, 1291–1321.
Clarke, H. D., Goodwin, M., & Whiteley, P. (2017). Why Britain voted for Brexit: An individual-level analysis of the 2016 referendum vote. *Parliamentary Affairs, 70*(3), 439–464.
Der Spiegel. (2005). Globalization: The new world. *7,* 74–77.
Edquist, C., & Johnson, B. (1997). Institutions & organizations in systems of innovation. In C. Edquist (Ed.), *Systems of innovation—Technologies, institutions & organizations* (pp. 41–63). Pinter Publishers.
Ehsan, R., & Sloam, J. (2020). Resources, values, identity: Young cosmopolitans and the referendum on British membership of the European Union. *Parliamentary Affairs, 73*(1), 46–65.
Elert, N., Henrekson, M., & Saunders, M. (2019). *The entrepreneurial society: A reform strategy for the European Union*. Springer.
Evans, D. S. (1989). Tests of alternative theories of firm growth. *Journal of Political Economy., 95*(4), 657–674.
Evans, D. S., & Jovanovic, B. (1989). An estimated model of entrepreneurial choice under liquidity constraints. *Journal of Political Economy, 97*(4), 808–827.
Ferguson, M. A. (2018). Building theory in public relations: Interorganizational relationships as a public relations paradigm. *Journal of Public Relations Research, 30*(4), 164–178.
Galbraith, J. K. (1952). *American capitalism*. Houghton Mifflin Company.
Giones, F., & Brem, A. (2017). Digital technology entrepreneurship: A definition and research agenda. *Technology Innovation Management Review, 7*(5), 44–51.
Goldfarb, A., & Tucker, C. (2019). Digital economics. *Journal of Economic Literature, 57*(1), 3–43.

Gompers, P., & Lerner, J. (2001). The venture capital revolution. *Journal of Economic Perspectives, 15*(2), 145–168.
Gramm, P. & Toomey, P. (2020, May 6). A new standard for free trade. *The Wall Street Journal*, A15.
Greenwood, J., & Jovanovic, B. (1999). The information-technology revolution & the stock market. *American Economic Review, 89*(2), 116–122.
Hobijn, B., & Jovanovic, B. (2001). The information-technology revolution & the stock market: Evidence. *American Economic Review, 91*(5), 1203–1220.
Jensen, M. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *Journal of Finance, 48*, 831–880.
Jovanovic, B. (1982). Selection & the evolution of industry. *Econometrica, 50*(3), 649–670.
Jovanovic, B. (2001). New technology & the small firm. *Small Business Economics, 16*(1), 53–56.
Jovanovic, B. (2019). The entrepreneurship premium. *Small Business Economics, 53*(3), 555–568.
Karlson, N., Sandström, C., & Wennberg, K. (2019). *Bureaucrats or markets in innovation policy*. Ratio Institute.
Kauffman Foundation. (2006). *Roadmap for an entrepreneurial economy*. Kaufman Foundation.
Kenney, M., & Zysman, J. (2016). The rise of the platform economy. *Issues in Science & Technology, 32*(3), 61–69.
Lafuente, E., Acs, Z. J. & Szerb, L. (2021). A composite indicator analysis for optimizing entrepreneurial ecosystems. *Research Policy*.
Lundstrom, H., & Harirchi, G. (2018). The social structure of entrepreneurship as a scientific field. *Research Policy, 47*, 650–662.
Lundstrom, A., & Stevenson, L. (2005). *Entrepreneurship policy*. Edward Elgar.
Lundvall, B.-Å. (1992). *National systems of innovations*. Pinter Publishers.
Malecki, E. J. (2018). Entrepreneurship & entrepreneurial ecosystems. *Geography Compass, 12*, e12359.
Mazzucato, M. (2013). *The entrepreneurial state: Debunking public vs private sector myths*. Anthem press.
Monsellato, A. (2015). *Tesla Motors: A business model innovation in the automobile industry*. Luiss Business School, University International, Sicily Italy.
Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship Theory & Practice, 41*(6), 1029–1055.
Nambisan, S., Siegel, D., & Kenney, M. (2018). On open innovation, platforms, & entrepreneurship. *Strategic Entrepreneurship Journal, 12*(3), 354–368.
Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation & entrepreneurship: Progress, challenges & key themes. *Research Policy, 48*(8), 103773.
Naudé, W. (2016). *Is European entrepreneurship in crisis? IZA Working Paper, DP 9817*.
Nelson, R. R. (Ed.). (1993). *National innovation systems: A comparative analysis*. Oxford University Press.
Oliner, S., & Sichel, D. (2002). Information technology and productivity: Where are we now and where are we going? *Economic Review – Federal Reserve Bank of Atlanta, 87*(3), 15–44.
Parker, S. C. (2004). *The economics of self-employment & entrepreneurship*. Cambridge.
Porter, M. E. (1990). *The competitive advantage of nations*. Free Press.
Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy, 98*(5), Part 2), S71–S102.
Root, H. L. (2020). *Network origins of the global economy: East vs West in a complex system perspective*. Cambridge University Press.
Sachs, J. D. (2020). *The ages of globalization: Geography, technology & institutions*. Columbia University Press.
Sahut, J. M., Iandoli, L., & Teulon, F. (2021). The age of digital entrepreneurship. *Small Business Economics, 56*, 1159–1169.
Schramm, K. (2004). Building entrepreneurial economies. *Foreign Affairs, 83*(4), 104–115.
Schramm, K. (2006). *The entrepreneurial imperative*. Collins.

Song, A. K. (2019). The digital entrepreneurial ecosystem—A critique & reconfiguration. *Small Business Economics, 53*(3), 569–590.
Sussan, F., & Acs, Z. J. (2017). The digital entrepreneurial ecosystem. *Small Business Economics, 49*(1), 55–73.
Terranova, T. (2000). Free labor: Producing culture for the digital economy. *Social Text, 18*(2), 33–58.
World Bank. (2017). *GDP per Capita, PPP (constant 2017 international $)*. Retrieved from https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD
Yardeni, E., & Abbott, J. (2021). *Industry indicators: FANGs*. Yardeni Research Inc. Retrieved from https://www.yardeni.com/pub/yardenifangoverview.pdf

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.