Industrializing an Oil-Based Economy: Evidence from Iran's Auto Industry

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Abstract: Two theoretical paradigms namely, the 'resource curse' and 'developmental state' would predict that industrial development in countries with abundance of capital-intensive natural resources and in states with patrimonial tendencies is doomed to failure. Iran's success in developing a dynamic auto industry, which in 2011 became the world's 12th largest automobile manufacturer with 1.6 million vehicles produced per year seems to contradict these perspectives. How was this technical capacity created in an oil-based economy—which provides little incentive for industrialization— and, in a country that has been under the United States and international sanctions since 1979 Revolution? In this paper, I will expand on the implications of these theoretical traditions to identify the structural factors that enabled the Iranian state to develop a large automobile sector and relatively diversify the economy. © 2020 John Wiley & Sons, Ltd.

Keywords: auto industry; developmental state; industrialization; Iran; resource curse

1 INTRODUCTION

Amid the enormous diversity of experience across the Global South to build a domestic automobile industry in the post-World War II era, Japan and South Korea managed to stand out. Later in the 1980s, however, China, India and Malaysia attempted to mimic their model and have relatively succeeded. Iran is a surprising addition to this list, which in 2011 became the world's 12th largest auto manufacturer and the 4th in the developing world. Successfully producing more than 1.6 million units of vehicles a year, Iran's auto industry is ranked higher than many countries in the Global North such as the United Kingdom (13) and Italy (24). Second to oil and gas, the auto industry is the largest sector

in the economy serving as a vast source of employment opportunities (i.e. 100000 direct employees and 1 million indirect employees) for the Iran's young population.

Strikingly, Iran's auto industry has been growing in a country characterized by an enormous isolation from the global economy. Even more striking is the fact that such a massive industrial sector germinated in a country flush with capital-intensive natural resources (i.e. oil and gas) and thus casting serious doubts on the old convention that minerals render the tradablfe sectors (i.e. manufacturing) uncompetitive-the phenomenon that economists coined 'resource curse' (Auty, 1990; Corden, 1984; Corden & Neary, 1982; Krugman, 1987; Sachs & Warner, 1995; Van Wijnbergen, 1984). The distortionary effect of the tremendous hard currency generated from the fossil fuels on the incentive structure of the economy notwithstanding, it is striking that an oil-based economy such as Iran has been able to diversify and oversee a formidable success in the automobile sector. Success is, of course, relative, but building a giant auto industry with an output of 1.6 million units of vehicle per year and ranking 12th in the world does merit calling it a success. Endowed with 10 and 16 per cent of world's total proven petroleum and natural gas reserves, respectively. Iran is the only 'rentier state' that has been able to develop a large industrial sector. Embarking on one of the world's fastest build-ups of scientific capabilities during the past three decades, Iran also boasts significant competence in other heavy industries such as steel, rubber, cement, iron as well as the cutting-edge sectors such as aerospace, nanotechnology and stem cells (Sanie, 2013; Torbat, 2010).¹

What explains the success of developing a dynamic industrial sector in an oil-based economy, and with a state that cannot, by any means, be identified as 'developmental?' After all, scholars agree that the post-revolutionary state in Iran has been politically fractious, rife with clientistic and patrimonial ties with various social groups including the business class. Indeed, the politically factionalized and internally fragmented state impeded the crystallization of bureaucratic cohesion (Harris, 2017; Keshavarzian, 2009; Moslem, 2002; Seifzadeh, 2003). Nowhere this lack of state cohesion is more conspicuous than Iran's seemingly haphazard economic policies since the 1980s (Harris, 2017).

In what follows, I explain why and how the Iranian state—despite the 'oil curse' and a bureaucracy that demonstrates strong patrimonial and predatory tendencies—succeeded to propel a respectable industrial transformation in the auto sector. In so doing, I rely on the theoretical underpinnings of the 'developmental state' (DS) literature. The causal argument goes as the following. Success in developing a large automobile industry in Iran despite a politically fragmented state with strong clientistic ties with the society—and indeed, despite the 'oil curse'—is the result of a 'collective action' on the part of technocratic state managers and the alliance they forged with the industrialists to protect the industry from the caprices of political factionalism (Mehri, 2015a, p. 408). As Mehri (2015a, 2017) has argued, technocratic state actors built an alliance with the firm managers in order to protect the auto industry and implement growth-inducing policies in the sector. But as I will demonstrate in this paper, two structural factors buttressed the state's capacity to develop a dynamic automobile industry.

¹Iran also ranks the fastest growing country in terms of 'scientific advancement' in the world. See a detailed account by Science Metrix, a Canadian-based independent research evaluation: Science- Metrix, Thirty years of science. Montreal: http://www.science-metrix.com/en/30years-Paper.pdf, and https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3732862/ accessed May 18, 2017.

First, Iran's demographic composition is a crucial factor. Sixty per cent of the country's 80 million population in 2010 were under 30 years old, and the need for generating employment opportunities for Iran's young labour force became all the more pressing for the state.² Given that modern oil and gas refineries are highly technology and capital intensive and that they do not generate ample employment opportunities, Iran's youth bulge created an incentive for the state to invest in auto sector (Askari, 2006; Pesaran, 2011). Second, Iran's economic isolation and the subsequent independence it enjoyed from the global neoliberal regime and its key institutions such as World Trade Organization (WTO) and the International Monetary Fund granted the state a relative autonomy to maintain the import substitution industrialization (henceforth, ISI) that was conducive towards developing local industries. More so, during the 1980s and 1990s when other states in the developing world were under tremendous pressure to liberalize the economy and free up the markets. This paper thus can be divided into four main sections. In the first section, I briefly lay out the core tenets of the DS literature and the process of 'state-led development'. In the second section, I examine the characteristics of post-revolutionary Iranian state within the framework of state-society relations, demonstrating how it departs from the DSs. In the third section, I discuss the rise of Iran's auto industry as a sector that developed organizational capacity to grow within the larger politically factionalized and incoherent state apparatus. In the final section, I explain how economic sanctions both helped and hindered the development of an indigenous auto industry in different ways.

1.1 Data and Method

Broadly, this research uses the 'within-case method' in comparative historical analysis. In particular, it relies on 'causal narrative' analysis in order to explore and trace the underlying processes and causes for the outcome of a particular phenomenon. Causal narrative is an analytical technique that allows researchers to identify the causes of a constellation of events that transpire sequentially and chronologically in order to provide a holistic account of the phenomenon under investigation (Lang, 2012, p. 40). The virtue of narrative analysis lies in the fact that it offers temporal orderings of events and processes while examining what caused them. This research will therefore use causal narrative analysis in order to delineate how Iran in-spite of structural constraints, such as oil curse, economic isolation and political factionalism, was able to induce growth in the automobile sector. In so doing, I draw on multiple sources of both primary and secondary data sets. The primary data on automobile production—both parts and finished vehicles—are drawn from the International Organization of Motor Vehicle Manufactures and Statistical Center of Iran. The data for economic and political indicators are drawn from Iran Data Portal, archival documents, newspapers, etc. All these data sources are publicly available.

1.2 State Capacity and Industrialization

Observing the tremendous industrial success of few countries in the Global South, namely, South Korea, Taiwan and recently the Chinese leviathan, scholars of development feature

²The details of Iran's age structure is outlined here: https://iranprimer.usip.org/resource/youth, accessed December 22, 2019.

the state as a crucial actor in the process of rapid industrialization. Hence, since the 1980s, a body of scholarship known as the 'developmental state' (henceforth, DS) has emerged, which posits that success in industrial development requires, in the Weberian sense, an autonomous and embedded bureaucracy to coordinate industrial activities (Chibber, 2003; Evans, 1995, 1998; Johnsen, 1982; Kohli, 2004; Mehri, 2017). According to the DS literature, states can be divided into three main categories: developmental, intermediate and predatory (Evans, 1995). On the one hand, a DS is endowed with a bureaucracy that actively coordinates economic activities towards higher rates of growth and dynamism. Japan, South Korea and Taiwan are the exemplars of the DS that achieved impressive growth rates over the past four decades (Amsden, 1989; Evans, 1998; Geddes, 1990; Kohli, 2004; Wade, 1992). On the other hand, a predatory state, as Evans (1995, p.12) defines, 'extracts at the expense of the society, undercutting development even in the narrow sense of capital accumulation'. Zaire and Yemen are the conspicuous examples of predatory states, where public institutions are subverted to serve private profits, and where the state provides 'little in the way of public good in return' (Evans, 1995, p. 12). Most developing states, however, depart from the Zarian predation and the Korean 'embedded autonomy'; they offer a combination of the two. The balance varies in different states across time and from organization to organization within the state. Brazil, India, Mexico, Turkey and Iran are good examples of the intermediate case, where the state bureaucracies demonstrate both developmental and predatory tendencies.

The DS literature identifies certain instruments that allow the state to develop a certain type of organizational capacity to prod the domestic firms to higher rates of productivity. Those characteristics and instruments include: (i) bureaucratic integrity; (ii) internal cohesiveness; (iii) nodal agency; and (iv) dense ties with firms (Amsden, 1989; Chang, 2002; Chibber, 2003, 2014; Evans, 1995; Johnson, 1982; Kohli, 2004; Wade, 1992; Woo-Cumings, 1999). The first signifies the overall integrity of the bureaucrats and the state actors. No DS can be achieved if the bureaucrats fail to follow the duties attached to their station (Chibber, 2014). But a functioning, rational bureaucracy alone is not sufficient for a successful industrial transformation. A functioning bureaucracy may succeed to create 'pockets of efficiency', in some sectors (Geddes, 1990, p. 225; Mehri, 2017), but success in aggregate scale is far from guaranteed without a cohesive apparatus to coordinate the state directives (Chibber, 2003, 2014). Indeed, bureaucratically robust states can be very fragmented, rife with agency-level conflicts. As I will demonstrate later, the Iranian state is a conspicuous example of such fragmentation. The most powerful reason for this is that agencies often have overlapping and even conflicting tasks and priorities. Hence, simply following the rules in this situation is likely to lead to state paralysis, not cohesiveness (Chibber, 2014). The third component, nodal agency, is also extremely important as successful DS have heavily relied on it to direct and monitor industrial activities. The Economic Planning Board in South Korea, the National Development Bank in Brazil and the Industrial Development & Renovation Organization of Iran (IDRO) functioned as effective nodal agencies (Chibber, 2003, 2014; Mehri, 2015). Once the nodal agency is in place, it has to forge dense ties with the firms to give and take feedback to ensure that firms comply with the directives (i.e. increasing competitiveness of the products, inducing higher rates of exports, etc.). Dense ties with the local firms facilitate a regular channel of communication by which state planners can learn not just about the firms' needs but also about the extent to which they are willing and able to follow plan directives and investment priorities (Chibber, 2014; Wade, 1992). How and in what

specific areas does the Iranian state diverge from the DS? I will now focus on the specificities and characteristics of the Iranian state.

2 IRAN'S POST-REVOLUTIONARY STATE

The post-revolutionary state in Iran is an intriguingly complex political system. Constituted by a series of composite institutional arrangements with competing roles, the Islamic Republic of Iran is a mélange of both "procedural democracy and obstructionist theocracy" (Sadri, 2018). The constitutional design and the way in which the loci of powers are clustered within both the republican institutions of the state (the legislature and the presidency) and the theocratic institutions (Guardian Council and Expediency) Council) facilitate political factionalism and undermine cohesiveness in the domain of policymaking. These countervailing (and often overlapping) loci of power have granted the state stability by inducing elite competition, but they have also rendered policymaking extremely incoherent (ibid; Saeidi, 2004). As Keshavarzian details, a number of state organizations with overlapping authorities have impeded the state's ability to develop a uniform and coherent regime of policymaking across various sectors of the economy. For instance, in the late 1990s, the Iranian state had as many as 30 centers and organs issue import licenses (Keshavarzian, 2009, p. 159). This plurality of licensing authorities undermines accountability and transparency. Figure 1 below demonstrates both republican and theocratic institutions of the Iranian state.As noted earlier, overlapping loci of power and political factionalism have been responsible for incoherent policy making. Factions in the Iranian polity can be distinguished on the basis of ideological orientation and strategic policymaking in three domains: the economy, the civil society and the foreign policy. Since the 1979 Revolution, the Iranian state has been rather mobile and dynamic. For example, many of the state managers who were once seen as 'conservative' in the early days of the 1979 Revolution have moved towards the more liberal and reformist camp (Arjomand, 2009; Moslem, 2002; Seifzadeh, 2003). But for about a decade following the 1979 Revolution, three politically active factions were visible in the Iranian parliament: (i) the right; (ii) the left; and (iii) the conservatives (Mehri, 2017; Moslem, 2002). The right advocated World Bank inspired neoliberal and free market economy; but, believed in conservative and interventionist social policies (i.e. the necessity to implement Islamic ordinances and laws in the public sphere) with regard to the civil society, coupled with 'anti-imperialist' (anti-United States) foreign policy. The 'left', while it supported socialist-leaning economic policies such as the nationalization of banks and heavy industries, was socially liberal and advocated the idea that the state should abstain from intervention in public sphere and that the civil society should be 'pluralist' (Arjomand, 2009; Moslem, 2002; Seifzadeh, 2003). The 'conservatives' combine the socialist-leaning economic policies with heavy intervention of the state in the public sphere (i.e. strong belief that the public sphere should be governed by Islamic law). In the late 1990s, however, a new faction known as the 'reformist camp' spearheaded by Mohammad Khatami, a liberal cleric whose victory in the 1997 presidential election stirred a hope for solidifying the democratic forces of the country through grass-roots movements, acquired strong visibility in the Iranian political landscape (Ansari, 2006; Malek-Ahmadi, 2015; Mirsepassi, 2010). Combining the two crucial dimensions of

The Structure of the Iranian State



Figure 1. The structure of the Iranian state. Source: This is a tweaked version of the figure by Kamrava & Hassan-Yari in their 'Suspended Equilibrium in Iran's Political System'. The Muslim World. (2004:506)

economy and society and the ideological orientation of the factions generates the conceptual framework for understanding the Iranian political factions (Figure 2).

2.1 Fragmented State but Embedded and Autonomous

The Iranian state, both before and after the 1979 revolution, has been autonomous from various social forces: thanks to fossil fuel reserves that obviate the need for taxation while endowing the state with a fiscal autonomy by ways of generating massive revenues for the exchequer. To be sure, the Iranian state does tax people and corporates' incomes as an additional source of revenue; but it hardly relies on it as a primary source for public investment (Amuzegar, 1977; Hakimian & Karshenas, 2000; Pesaran, 2011). Furthermore, most enterprises in Iran are state run and that grants even more autonomy to the state because it maintains strong command and control over the flow of investment (Amuzegar, 1993; Harris, 2013; Karshenas 1990). With an exchequer bloated with oil and gas revenues, the Iranian state has a significant control over the flow of investment in whatever sectors it desires. This fiscal independence is what bestows considerable autonomy to the state from social forces. The Iranian state also has a large stake in capital formation where a predominant part of total investment in the economy is in the public sector (Harris, 2013; Pesaran, 2011). While the sources of Iran's revenues from minerals have been constrained dramatically with last round of

Dimensions of Factional Politics in Iran

Degree of Intervention in the Economy



Figure 2. Dimensions of Factional Politics in Iran. Source: Author's formulation

economic sanctions in 2012 onwards, yet the state has been able to receive handsome revenues prior to the nuclear crisis (Movahed, 2019). The state has been embedded in the society through alliances that it has built with various social classes (Harris, 2017,

pp. 80–83). The merchant capitalists' alliance (the baza'ar) with the clergy based on religious grounds both during the anti-Shah struggles of the 1979 Revolution and also after the fall of the Shah is nothing new (Abrahamian, 1982; Keshavarzian, 2009; Moslem, 2002). Indeed, the state has been particularly selective in regulating its relations with the baza'ar by building a preferential and clientelistic network with some members of the baza'ar, granting a few of them import monopolies (Keshavarzian, 2009). Recent studies also demonstrate that the Iranian state has been embedded among a set of diverse non-elite groups through its expansive welfare policies and parastatal organizations (Harris, 2013, 2017, pp. 117–120).

If the characteristics of the Iranian state—as I discussed—depart from those of the DS, how then it was able to develop a large industrial sector with 1.6 million units of production and rank 12th in the world? To be sure, there are states that did not face the constraints that Iran does due to its political and economic isolation, yet they were not able to develop an indigenous auto sector with more than 70 per cent local content the way Iran was. As Table 1 shows, only a handful of countries in the developing made their way to becoming the largest auto manufacturers in the world. It could be suggested that because Iran is an oil-producing country and the gasoline prices tend to be low, the demand for automobiles tends to be high. While it is true that cheap gasoline prices increase the demand for vehicles, but they are unlikely to create incentives for developing a local auto industry—specially in an oil-based economy such as Iran. Here, a comparison with Saudi Arabia (and other petro-monarchies of the Persian Gulf) is particularly informative. The gasoline price in Saudi Arabia is as cheap as Iran when the Kingdom's per capita income is also taken into account, but neither Saudi Arabia nor any other rentier state has been able to develop such a large industrial sector (Cammett, Diwan, Richards, & Waterbury, 2013).

Rank	Country	Total Vehicles	
1	China	13 790994	
2	Japan	7 934057	
3	USA	5 709431	
4	Germany	5 209857	
5	South Korea	3 512926	
6	Brazil	3 182923	
7	India	2 641550	
8	Spain	2 170078	
9	France	2 047693	
10	Mexico	1 561052	
11	Canada	1 490482	
12	Iran	1 394075	
13	UK	1 090139	
14	Thailand	999 378	
15	Czech Rep.	983 243	
16	Poland	878 998	
17	Italy	843 239	

Table 1. The ranking of world auto manufacturers in 2011

Source: The annual report published by Worldometers (http://www.worldometers.info/cars/).

Hence, the mere fact that such as a large auto manufacturing sector—whatever its shortcomings—was developed and survived in Iran is an achievement that ought not to be slighted. The development of Iran's auto industry as a 'pocket of efficiency' has been examined in important works by Mehri (2015a, 2017), which I draw on in order to delineate the underlying processes that induced growth in the sector. But as I will discuss later in the paper, the development of the auto industry in Iran cannot be fully grasped independent of the structural factors such as the pressing need for generating employment and the relative autonomy of the state to implement the ISI strategy. As I will argue, these structural factors abetted the state to oversee growth in the auto sector.

3 FORMATION OF IRAN'S AUTO INDUSTRY

A national auto industry was established in Iran in the late 1960s when the Shah implemented the country's third French-model, 5-year indicative development plan (Alizadeh, 1984). As a result, the Shah assisted Mahmoud Khayyami—an Iranian industrialist—to establish the first national automobile company known as 'Iran National'. In 1969, Iran National signed an agreement with Rootes Group in the England to assemble 'Hilman Hunter' in Iran through a complete 'knock-down kits process' (Manteghi, 2011, p. 81). Once the assembly line of Hilman Hunter was established, Iran's first nationally assembled car was named 'Peykan', which translates to 'arrow' in English. Citroën also established a presence in Iran and American Motors Corporation and General Motors started local assembly operations in the country. Local content increased to 24 per cent, and annual production of assembled vehicles reached 190000 units by the 1979 revolution (Alizadeh, 1984; Mehri, 2015a). It must be stressed that despite 17 years since the auto industry was initiated in Iran, the production was limited to only assembly lines and the local contents never exceeded 24 per cent. This stands in glaring contrast with the post-revolutionary era: within just a decade from 2000–2010, the production of



Manufacturing Employment in Iran (1960-2012)

Figure 3. Manufacturing employment in Iran (1960–2012). Source: Iran Data Portal: http:// irandataportal.syr.edu/labor-force

automobiles in Iran has grown tenfold, reaching to 1600000 units of vehicle with more than 70 per cent local content produced domestically (Mehri, 2015a; see Figure 4). As I will discuss in the passages that follow, this requires developing an indigenous technical capacity. Technocracy and expansion of human capital in the sector has been a crucial contributing factor to its development.



Figure 4. Number of automobiles produced. Source. The figure is reproduced from Darius Mehri's 'Pockets of Efficiency and the Rise of Iran Auto', Studies in Comparative International Development, (2015a: 416). The data are originally obtained from Parvin Alizadeh's unpublished dissertation The Process of Import Substitution Industrialization in Iran (1960–1978) at University Sussex. The data for production after the 1979 were obtained from Iran Statistical Center: https:// www.amar.org.ir/english/Statistics-by-Topic/Industry#2221489-time-series, accessed June 12, 2018

From 1979 to 1992, the auto production declined largely due to the protracted Iraq– Iran War (1980–1988). At the same time, foreign automobile companies with the exception of Talbot left Iran (Mehri, 2015a, 2017). As is customary in war economies, high risk of destruction and political instability preclude systematic development planning. Production lines, too, tend to cater towards manufacturing military equipment (Amirahmadi, 1990; Amuzegar, 1997). Thus, during the 8 years of Iraq–Iran War, the country's industrial growth stagnated with the exception of heavy military equipment manufacturing. By the end of the Iraq–Iran War (1980–1988), the annual production had fallen to only 24000 units of vehicle, and the production itself had shifted from passenger to commercial cars during the war (Mehri, 2015a).

However, as Mehri (2015a) details, the 2 years from 1990-1992 mark the rise of technocrats occupying the key positions of power within the industrial organization of the country, where they could apply their technocratic blade to the automobile industry and generate growth in the sector. But two concomitant events in addition to the rise of technocrats holding key positions bolstered the state's capacity to develop a local auto industry: (i) the ever-more pressing need for creating ample employment opportunities as the result of the youth bulge and demographic transition; and (ii) the state's relative autonomy from international organizations to implement a set of interventionist industrial policy including the ISI. As Figure 3 demonstrates, the manufacturing employment has been growing in tandem with the growth of the auto industry in Iran, in both subsequent decades of 1990s and 2000s in which the auto industry rapidly expanded. These two structural factors are crucial as they abetted the growth of the sector. As emphasized, the steppingstone towards expanding the auto sector was a resort to the import substitution policy, precisely at the time that other developing countries had begun to abandon a vast panoply of interventionist policies and liberalize their economies (Wade 2003). It is worth noting that in a recent and important report, the International Monetary Fund admitted that

"during the later period, 1980–2010, when import substitution policies were rolled back in most developing economies, the *average growth rates of manufacturing* production dropped significantly, and manufacturing stagnated in many economies (Cherif & Hasanov, 2019, p. 52; emphasis added)".

Therefore, Iran's economic isolation and lack of integration in the global economy and hence its independence from international monetary organizations such as the International Monetary Fund and the World Bank granted the state a relative autonomy to implement the import-substitution industrialization at the time that other developing counties were under pressure to abandon it. As a result, strong infant industry protection laws were enforced, which led to a drastic increase in both production of vehicles and local parts. Simultaneously, the state encouraged entrepreneurial production in local parts. The upshot was that local parts suppliers in Iran witnessed a rapid growth: from 34 in 1988 to approximately 400 by 1997 and to 600 by 2011 (Manteghi, 2011; Mehri, 2015a).

By 2011, annual production increased to 1.6 million vehicles with more than 70 per cent local content, which placed Iran as the world's 12th largest auto producer. Figure 4 demonstrates the annual production as well as the local content over the period of 1969–2009. As mentioned earlier, the growth of the auto industry after the 1979 Revolution stands in glaring contrast with the preceding decades under the Shah—despite 17 years since it was first established, the industry by 1979 had only a low volume of assembly lines (Mehri, 2015a, 2017).

Two giant companies dominate the automotive markets in Iran. Saipa Yadak and Iran Khodro have 94 per cent of the domestic market share, even though there are 11 other relatively small and privately owned auto producers. A large pool of research and development engineers and technicians are currently involved in designing vehicles with national brands with more than 70 per cent of the parts being manufactured domestically (Mehri, 2015a; Rahmati & Yousefi, 2011). Both Iran Khodro and Saipa are state-owned enterprises, and the average annual growth of the industry since 2000 has been 29 per cent per year (Abedini & Péridy, 2009; Mehri, 2015a). The auto industry generates an annual income of 20 billion dollars and is ranked as the second largest sector in the economy after oil and gas. In 2011, Iran was ranked the 4th largest auto manufacturer in the developing world growth standing next to China, Taiwan and India (Abedini & Péridy, 2009). Table 1 demonstrates the overall ranking of the country's auto industry in comparative perspective.

3.1 Factional Politics Undermined Auto Industry

As alluded earlier, developing such a large industrial sector in a state as factionalized and fragmented as Iran would be doomed to failure according to the DS literature (Mehri, 2015a, 2017). But the question to ask is how, then, Iran succeeded to develop the auto sector when it fails to craft and implement coherent economic policies? As Mehri demonstrates, throughout the 1980s, Iran's post-revolutionary state has been an arena of contestation for three influential—but foundationally contradictory—economic policies such as neoliberal commercialization, left national development and national planned economy. On the one hand, the left supported socialist-statist economic policies: (i) nationalization of banks and large industries; (ii) banning imports (including automobiles) and achieving economic autarky and self-sufficiency; and (iii) redistribution of wealth through subsidies and price controls (Baktiari, 1996; Mehri, 2015a; Moslem, 2002; Siavoshi, 1992). The left itself was divided on economic strategy. A group of them, known as the 'industrial nationalists' within the left who were present in the parliament and other state apparatus believed that Iran does have the ingredients to embark on national industrial projects. They also believed that ties with the West—at least with Europe, if not the United States—are crucial for technology transfer (Mehri, 2015a, 2017:57).

On the other hand, the right supported free markets, liberalized trade and privatization of all industries. It vociferously opposed any kind of state-led development. Historically, both the right and the conservatives had strong ties with the Iranian merchant capital (the baza'ar) and therefore sought to promote economic strategies supporting commerce as opposed to industrial planning (Keshavarzian, 2009; Moslem, 2002). In the first 10 years since the 1979 Revolution, the left faction dominated the Iranian parliament and the executive branch, while the conservatives had robust visibility in the judiciary (Mehri, 2015a).

The industrial nationalists within the left faction were highly technocratic; many of whom had obtained graduate degrees from highly ranked American and Iranian universities (Mehri, 2015a). Iran's Sharif University of Technology, which was hailed by the Chairman of the Department of Electrical Engineering at Stanford University as 'the finest university in the world preparing undergraduate electrical engineers' was instrumental in training many competent engineers. Apart from the industrial nationalists within the left, the vast majority of this faction supported agricultural development as

opposed to industrial development. They believed that agricultural development would better serve the state's ambitions to acquire economic autarky and self-sufficiency (Mehri, 2015a; Moslem, 2002). Given this factionalized political climate where opposition to developing a national auto industry came from both political factions, industrial nationalists within the left engaged in lobbying and building alliances in order to 'protect' the auto industry from the stringent opposition and predation that came from other factions (Mehri, 2017, pp. 64–68, 2015a).

3.2 Building Alliance, Forging Coherence

In the aftermath of Iran–Iraq War in 1988, state mangers sought an effective strategy to reconstruct the economy. The auto industry demonstrated potentials for growth. Iran Khodro began localization of manufacturing by purchasing Talbot's manufacturing lines, including 2000 machines for 13 million dollars (Manteghi, 2011; Mehri, 2015a). Behzad Nabavi who was then the Minister of Industry believed that deploying the Talbot's manufacturing lines would be useful to expand the local technical capacity within the auto industry. His ultimate goal was to develop an auto industry with high local content with modern technology (Mehri, 2015a, p. 421). To realize this vision, he signed a contract with the French Peugeot to manufacture the Peugeot 405 in Iran. The Peugeot 405 was at that time one of Europe's most technically advanced passenger car (ibid).

In 1989, Hashemi-Rafsanjani was elected as Iran's president from the right faction. He chose Nejat-Hosseinian, and later Reza Nematzadeh—George Washington University and UC Berkeley PhDs in Transportation and Industrial Engineering, respectively—as the new ministers of industry led to further development of the auto industry. Endowed with a significant degree of autonomy to formulate and implement policies, Nejat-Hosseinian built close ties with the automobile industry by establishing the 'Automobile Committee', which included 30 executives and experts in the auto industry (Mehri, 2017, p. 60). The Automobile Committee was tasked with crafting effective industrial policies by ways of receiving feedback from the government and industrial managers at Iran's largest automobile companies. The committee acted as an agency to not only coordinate domestic industrial activities but also set guidelines for subsidies and fiscal support for the industry and facilitate technology transfer from multinational companies to local auto suppliers (Manteghi, 2011; Mehri, 2015a, 2017).

An effective strategy that enhanced the profitability of the local auto manufacturing firms was to dismiss the price controls (Mehri, 2015a, p. 421). Inspired by the populist economic policies of the early years of 1979 Revolution, the state had deliberately kept the automobile prices artificially low in order to allow the poor segments of the Iranian society to own vehicles. But once the price controls were dismissed in 1989, the auto sector became a thriving industry in terms of profitability and that encouraged the private entrepreneurs to invest the industry (Mehri, 2015a, 2017). The IDRO of Iran—especially after the Automobile Committee was established—acted as an effective nodal agency, building strong ties with auto companies as well as state institutions (i.e. Ministry of Industry), which then led to implementing policies that led to the growth of the sector (Mehri, 2015a, p. 411).

3.3 Shielding the Industry

While the auto industry was beginning to show signs of growth by early 1990s, its survival was directly threatened by the agricultural left who advocated mobilizing the country's resources in favour of agricultural as opposed to industrial development. In the parliament, they vociferously opposed the contract with the French Peugeot because for them, this would increase Iran's dependence on the 'imperialists' and would undermine the country's ambitions to achieve economic autarky and self-sufficiency (Mehri, 2015a, p. 432). Through series of negotiations and lobbying in the parliament, the industrial nationalists on the left succeeded to convince the conservatives from the right faction to stop opposing the contract with the French Peugeot (Mehri, 2015a). The industrialists on the left also had to struggle with conservatives who favoured trade liberalization. For instance, in 1990, Mohammad Reza Bahonar, an influential member of the right faction vehemently argued in the parliament developing local industries in Iran is doomed to failure. He stated:

"In commerce sector, our country has great potential for becoming an international merchant. I do not have high hopes that at any time (in the future) our manufacturing or agriculture can meet our country's expectations. But I do believe that we have considerable capacities of becoming a connecting bridge of many countries (Moslem, 2002, p. 101)".³

Trade liberalization, which was aggressively enforced by President Rafsanjani from the right faction in the early 1990s, dramatically increased the auto imports as well as finished automobiles (Mehri, 2015a, 2017). Because tariffs were not applied at that time, the imports of finished foreign vehicles dramatically increased from about 7000 units in 1991 to 50000 in 1992 (Mehri, 2015a, p. 423). This accounted for almost 50 per cent of the total number of vehicles sold in the country at that time (ibid). The industrial nationalists from the left faction viewed the liberalization policy of Rafsanjani as a direct threat to the survival of the local auto industry. For example, in 1992, Iran witnessed a net worth of 5 billion dollars of auto imports, which almost squelched the local auto industry (Mehri, 2015a, p. 423). To push for a change in policy, the industrial nationalists from the left faction along with the auto firm managers engaged in lobbying strategies with the parliamentarians to pass a bill that would be propitious to domestic industry protection. As Mehri (2015a, p. 423) documents in detail, the 'Automobile Law' was passed, which enforced heavy a heavy tariff of 200 per cent on importing foreign automobiles (ibid). Hence, the mere existence of a nodal agency known as the IDRO provided a channel of communication between firm managers and policymakers, which then led to policy amendment in favour of developing a local auto industry 2.

3.4 Developing Domestic Technical Capacity

Two governmental organs preside over the organization of heavy industries in Iran: (i) The Ministry or Industry, Mine, and Trade; and (ii) The IDRO of Iran (IDRO Group) that plays the role akin to a nodal agency, whose mission is to promote industrial and manufacturing growth in the country. This mission entails planning the industrial zones, providing fiscal resources for the industrial projects, facilitating partnerships with foreign companies to

³It was originally cited from Etela'at Newspaper, April 21, 1990.

attract both investment and technology, connecting the local industries with the global value chain, providing feedback to improve the quality of the products and inducing higher rates of exports. The auto companies themselves are also responsible for building organizational capacity to advance R&D facilities, building factories and transferring technology from multinational corporations in order to create local technical capacity (Manteghi, 2011; Mehri, 2017; Rahmati, 2011). The private sector is largely responsible for producing parts assembled in Iran Khodro and Saipa factories (Mehri, 2015a). The organizational hierarchy of the automobile industry is demonstrated in Figure 5. IDRP owns most of the shares of Iran Khodro and Saipa. The parliament allocates budget to the Ministry of Industry just like any other ministry for funding projects, and the Ministry itself can independently decide which projects to fund without a need to seek the approval from the parliament. The Ministry of Industry works with IDRO to arrange project financing but grants Iran Khodro and Saipa the autonomy over the type of projects. The firm managers can independently make important organizational and technical decisions for the development projects. Those include setting targets, drafting technology transfer agreements with multinational corporations and monitoring the quality of the technology transferred (ibid).





Figure 5. Industrial hierarchy of the automobile industry. Source: IDRO website. Detailed version of this is available on http://www.idro.ir/enus/Corporate_Governance/Pages/Organizational_Chart. aspx. Organizational chart of auto industry is also demonstrated in Mehri (2015a)

The nodal agency (i.e. IDRO and Automobile Committee) forged close ties between the bureaucracy and industry. These dense ties were further fostered between 1992– 2005, which allowed to effectively coordinate the decision-making processes for the auto industry. The meetings that were held between firm managers and IDRO officials facilitated coordinating a number of large-scale industrial activities: from setting targets for the volume of production to determining what type of vehicle each company will have to manufacture. As Mehri (2015a, p. 424) suggests, the meetings brought 'all the important managing directors of the most important organizations in Iran to share knowledge among the managers working in the industry'. This included IDRO officials, the Minister of Industry and even the directors of the major banks (ibid).

It is crucial to note that Iran has relied more on the conventional strategies of industrial development (i.e. fostering backward linkages, reverse engineering, etc.) The localization of the Peykan through reverse engineering was the key element to developing an auto industry with multiple brands, and with high local content in Iran (Manteghi, 2011; Mehri, 2015a, p. 432). But the purchase of the British Talbot manufacturing equipment alone could not enable the state to develop the necessary technical capacity for manufacturing parts and content domestically. To fill this technological gap, they initiated the project 'Peykan without Talbot' at Iran Khodro while relying on reverse engineering to build the most parts (Mehri, 2015a, p. 424, 2017). The strategy was to source the auto parts that companies in Iran were capable of producing and those that were more complex from the United Kingdom, Italy, Japan and Korea. This allowed them to source most of the auto parts (1200 parts) from domestic firms and the rest (150 parts) from abroad (ibid).

To increase the scale of auto parts production, firm managers founded a supply chain company called SAPCO, which was designed to manufacture parts for Iran Khodro. The private entrepreneurs were incentivized to invest in SAPCO. This strategy turned out to be effective: Iran Khodro's parts supply capacity increased manifold, from 50 in 1992 to 600 tier-one suppliers by the early 2000s (Manteghi, 2011; Mehri, 2015a, p. 425). Additionally, the private entrepreneurs were offered subsidies to establish a parts company as a subsidiary extension of SAPCO and were guaranteed purchase of their parts for 5 years. To induce competition among parts suppliers, IDRO and firm managers set multi-tiers standards (i.e. A, B, C and D) for quality. Iran Khodro would only buy parts that met either A or B quality criteria, and this was a strategy they deployed to monitor and relatively improve the quality of auto parts that were manufactured domestically (Mehri, 2015a, 2017).

The other effective strategy that the Director General of IDRO, Akbar Torkan, adopted in the mid-1990s was to merge several auto companies into giant conglomerates known as Iran Khodro and Saipa Groups. This strategy optimized the profitability of the auto parts production by ways of economies of scale (Mehri, 2017, pp. 68–70). Because the domestic auto producers could now engage in cost-cutting strategies by ways of mass production, the economic incentives were set in place for the private entrepreneurs to invest in SAPCO. Had they relied on importing auto parts from abroad, they could not have achieved the economies of scale and hence the profitability of manufacturing auto parts would have been severely curtailed. The conglomerates consist of a number of large divisions including engine production, research and development as well as auto parts manufacturing. They also had different specializations: Iran Khodro was tasked to produce mid-priced and luxury sedans, whereas Saipa was assigned to manufacture cheaper and compact vehicles (Mehri, 2015a, p. 425).

Additionally, in order to expand the domestic technical capacity and increase the number of national brands, state actors along with the firm managers embarked on the Samand vehicle project in 2002. As a result, Iran Khodro attempted to extend its ties with multinational companies, particularly with Germany's FEV, in order to acquire the technology and training to design and manufacture (Mehri, 2015b, 2017, pp. 104–106). Germany's FEV played a significant role in technology transfer and strengthening the ties between local auto parts manufacturers and European companies (Mehri, 2015b). The upshot was that more than 150 license agreements were signed with 45 Iranian auto parts manufacturers to supply parts to foreign companies including the Japanese Nissan and the French Renault (Mehri, 2015a, p. 432). The Nissan models manufactured with Iranian parts under license include the Maxima, Roniz (Xterra), Teana, Patrol and Safari, and the Renault models include Dacia Logan and Megane. In addition to the joint ventures with foreign companies, Iran Khodro increased the number of local automobiles with national brands such as Runna, Dena, Soren and Pars Tondar with different designs and features and with better quality. In the mid-2000s, Iran Khodro along with two other technical universities also embarked on manufacturing electrical and solar vehicles and motorcycles.⁴ So much was said about how Iran developed a local technical capacity in the auto sector. But how successful has it been? What are the measures of success and how can we draw meaningful comparisons in order to assess Iran's relative success?

3.5 Determinants of Success

In order to determine the industry's success, one should compare it with those of the countries in the Global South, namely, China, India, Malaysia and Iran that attempted to build one. As Mehri (2015a, p. 417) suggests, two measures and elements of success can be taken into consideration while comparing the Iranian auto industry with those that were built in other countries in the Global South: (i) production volume greater than 1 million; (ii) ability to produce vehicles that meet global quality standards, as determined by J.D. Power and Associates, and exports to global markets with a value larger than \$1 billion (Womack et al., 2007). The first criterion is crucial in assessing the success of an auto industry because manufacturing parts is expensive, and the supply chain has to be cost effective enough to produce them at cost that allows the manufacturing to achieve economies of scale (Womack et al., 2007). Iran was able to forge backward and forward linkages between the auto industry and parts manufacturing as well as the broader slew of heavy industries (steel, rubber, etc.). Looking at Table 2 below, it becomes clear that China, India and Iran achieved greater than 1 million units of vehicle production, while Malaysia did not. But none of the aforesaid countries were able manufacture 'world-class' automobiles.⁵ As Table 2 below demonstratres, China has the highest value of exports (\$3.8 billion), while India, Iran and Malaysia rank second (\$3.6 billion), third (\$380 million) and fourth (\$183 million), respectively. When it comes to auto parts, China again leads the group and has the highest value of exports of auto parts (20 billion). Iran's

⁴See the report on electrical and solar vehicles: https://financialtribune.com/articles/auto/57872/iran president-test-drives-domestic-electric-car, accessed June 2, 2019.

⁵See J.D. Power quality rating report, https://www.jdpower.com/business/press-releases/2019-malaysia-initialquality-study.Also see quality rating by brands: https://www.jdpower.com/business/ratings/study/U.S.-Automotive-Performance%2C-Execution-and-Layout-%28APEAL%29-Study/10155ENG/CompactCar/941, accessed February 2, 2020.

Measures of success	China	India	Malaysia	Iran
Production > 1 million	Yes	Yes	No	Yes
Global quality standards	No	No	No	No
Exports > \$1 billion vehicles	3.75	3.62	0.183	0.50
Parts	20.35	2.76	0.825	0.07

Table 2. Iran's auto industry in comparative perspectives

Darius Mehri's 'Pockets of Efficiency and the Rise of Iran Auto', *Studies in Comparative International Development*, (2015a, p. 417). Based on the data (2011) available at United Nations Comtrade: http://comtrade.un.orgs.

volume of auto parts exports is small and amounts to only 70 billion dollars (Mehri, 2015a, p. 417). This comparison clearly shows that Iran achieved similar success when its auto industry is assessed with other countries (ibid). More so, when we closely compare Iran with Malaysia, whose auto industry is barely successful. It is crucial to note that reason that Iran has not been able to achieve higher rates of auto parts exports lies in the fact that Iran is less integrated in the global economy due to economic embargo. In the following section, I will examine the role of economic sanctions on Iran, given that the impact of sanctions on the Iranian economy depending on which entity imposed them on the country varies significantly over time.

4 UNILATERAL AND MULTILATERAL SANCTIONS

Iran's isolation from the global economy has granted the state a relative autonomy to pursue policies that are conducive towards developing local manufacturing in the auto sector. Even with respect to promoting exports, Iran's auto industry does relatively well in the international markets—compared with the standards of the Global South—by exporting over 500 million dollars' worth of completely built-up automobiles and parts to countries such as Russia, China, Turkey, Venezuela, Ukraine, Belarus and Iraq, where Iran has strong political ties (Abedini & Péridy, 2009; Mehri, 2015a).⁶ But isolation— particularly when translated to coercive means such economic sanctions-can certainly limit the possibilities of further growth depending on the type and nature of sanctions. That has been the case in Iran's auto industry. Two types of sanctions have been imposed on Iran since the 1979 Revolution, but their impact varies significantly over time. The first type of sanctions was unilaterally imposed by the United States, which date back to early days of the 1979 Revolution. The latter type is related to the nuclear programme and were imposed starting in 2006 onward. The U.S. unilateral sanctions, while they did contribute to impeding the Iranian economy from integrating into the global economy through various international instruments such as the WTO-where the United States exerts enormous influence-they did not negatively impact the development of local industries in the country. In fact, the unilateral sanctions imposed by the United States were deliberately ignored by the Europeans (Brzezinski, Scowcroft, & Murphy 1997; Fayazmanesh, 2010; Mehri, 2015a), who continued to trade with Iran, with Germany being the country's largest trade partner for two decades after the 1979 Revolution. It is worth noting that Iran's GDP

⁶See a detailed report on Iran's exports http://www.sandiegouniontribune.com/sdut-iran-resumes-auto-exports-to-russia-2014jun29-story.html, accessed 18 June 2017.

hovered around 5 per cent per annum, at times reaching to 8 per cent, despite unilateral U. S. sanctions in 1990s and 2000s (Movahed, 2015). Hence, Iran's economic isolation bolstered the industrial base of the country simply because Iran could continue implementing the ISI strategy while remaining insulated from repercussions of the WTO-inspired policy of 'free up the market and flourish' As Palma details, manufacturing productivity in many middle-income counties in Latin America (i.e. Brazil, Mexico, Colombia and Chile) with similar conditional backgrounds in terms of GDP growth, productivity and labour force declined as a result of abandoning the ISI strategy in the early1980s compared with the era prior to neoliberalism (2011).

However, the nuclear-related sanctions led by the UN Security Council that started to be enforced in 2006 onward were crippling. By 2012, when Iran's Central Bank's SWIFT code was sanctioned, European banks were banned to issue a letter for credit to Iranian clients, which restricted the flow of capital into Iran by ways of drastically increasing the transactions costs (Movahed, 2015, 2019). It was herein that circumventing the UN sanctions became almost impossible for the Iranian state and the GDP, which was growing by 5 to 6 per cent, suddenly turned negative in 2011 (Movahed, 2019). At this critical juncture, the auto industry's production also fell down dramatically. So far as the auto industry is concerned, the unit vehicle production also dropped significantly: from almost 1700000^7 units of vehicle in 2011 to around 740000 in 2013.⁸In 2015, when the Iran Nuclear Deal was sealed, the country immediately received sanctions relief, and its GDP promptly grew by an impressive rate of 12 per cent. The European companies started re-investing in the country's key sectors such as oil, gas and automobiles. But then in May 2018, President Trump withdrew from the Iran Deal and re-imposed the U.S. unilateral sanctions. Unlike the U.S. unilateral sanctions that were imposed in the prior decades, this time around they turned out to be effective because their scale and scope are much greater. In fact, since 2018, the United States has adopted the policy of 'maximum pressure' on Iran and has set criteria of severe fiscal punishment for the European and East Asian companies if they engage Iran in trade and investment. The European Union countries that have remained in the Iran Nuclear Deal attempted to create a financial channel independent of the SWIFT for trade and business with Iran, but their attempts have been so far in vain (Movahed, 2019). The deleterious effects of Trump administration's re-imposition of sanctions in the aftermath of its withdrawal from the nuclear agreement in 2018 have spilled over into various sectors of the Iranian economy including the automobile industry. For example, Iran produced more than 1.5 million units of vehicle in 2017, but in 2019-just a year after Trump administration's reimposition of economic sanctions—the production of units dropped by a staggering rate of 45 per cent, reaching to around 820000.9

4.1 Concerns Over the Quality

Reducing quality gap has been a major concern for auto manufacturers in the developing world. In the post-World War II era, only two countries from the non-Atlantic world,

⁷See the latest report by OICA: http://www.oica.net/category/production-statistics/2011-statistics/, accessed January 24, 2019. ⁸ibid.

⁹The data on 2019 vehicle production are reported by OICA at http://www.oica.net/category/production-statistics/

namely, Japan and South Korea, succeeded to produce vehicles that meet the global highquality standards. Vehicles produced in China India, and Malaysia have tried to raise their quality standards, but they are still far behind in terms of global quality standards set by the Japanese and European automobiles according to J.D. Power-an internationally recognized consumer intelligence company on automobile quality (Mehri, 2015a, 2017).J.D. Power assesses the overall quality scores that are determined based on reports per 100 vehicles (PP100): the lower number of problems reported indicates better quality. To present this in comparative perspectives, Chinese automobiles on average score of 158 PPO, whereas international and world-class brands have an average score of 104 PPO. J.D. Power does not conduct satisfaction survey in Iran, but IDRO follows the same quality rating procedures (Mehri, 2015a, 2017). It rates vehicles as A (highest quality), B or C (lowest quality). Iranian-made vehicles consistently receive B and C grades: Samand (B), Peugeot 405 (B), Dena (B), Runna (B) and Kia Pride (C) (Mehri, 2015a, p. 416, 2017). The two vehicles that receive the A grade in IDRO quality ranking are Mazda 3 and Renault Xanita, whose original manufacturing countries are Japan and France, which only have 40 per cent local content (ibid). The Iranian brands such as Samand and Runna that have more than 70 per cent local content rank lower in terms of quality than Mazda 3 and Renault Xanita.¹⁰The Iranian national brand vehicles are not-by any means-globally competitive, and local manufacturers have failed to reduce the quality gap of the national brand automobiles with the globally reputable ones. In this respect, Iran has not been able to reduce quality gap at the pace that China, India and Malaysia (that still do not produce world-class automobiles) can. This has largely been the result of economic isolation because those countries have been able to forge ties with multinational companies at much greater scale, whereas these opportunities have been constrained for Iran (Manteghi, 2011; Mehri, 2015b, 2017). Those countries, particularly China and India, s have also been able to promote exports of

their domestically manufactured automobiles at much greater volume than Iran because it is less integrated in the global economy and has faced structural constraints such as economic sanctions and political isolation.

5 CONCLUSION

The resource curse theory would predict that attempts at developing a large and dynamic auto industry in Iran are likely to fail. It is no longer an arcane notion, as the resource curse theory suggests, that countries with abundance of capital-intensive natural resources such as fossil fuels and minerals are likely to fail in diversifying their economic portfolio. Iran's success in developing a large auto manufacturing sector seems to contradict the perspectives that the resource curse literature draws on. The DS theory also predicts that successful industrial development requires a cohesive, embedded and autonomous state to effectively coordinate economic activities and prod the domestic firms towards higher rates of growth and dynamism. Iran's auto industry, however, was developed in a fragmented state apparatus, rife with political factions with opposing interests and policymaking agendas. Hence, both resource curse and DS theories posit that attempts at developing a successful industrial sector in Iran would be doomed to failure, not only because of the fractious and factionalized state apparatus but also because of the fact that

¹⁰See recent report on quality here: https://www.pedal.ir, accessed February 10, 2020.

Iran has an oil-based economy that provides little incentive to embark on large-scale manufacturing sectors. How, then, the Iranian state succeeded to develop a respectable auto industry despite the oil curse?

As I suggested in the paper, the development of auto industry in Iran cannot be fully grasped independent of the structural factors that enabled the state to curb the deleterious effects of the 'resource curse' and relatively diversify the economy. Iran's economic isolation from the global neoliberal regime granted the state a significant degree of autonomy to enforce policies conducive towards developing local manufacturing. More so at the time that other developing countries were under tremendous pressure to abandon such interventionist economic policies. Additionally, Iran's youth bulge and subsequently the state's pressing need for generating employment for the country's young population created an incentive to invest in the auto manufacturing sector. Considering that the modern oil and gas refineries are highly technology and capital-intensive and that they do not generate ample employment, the state viewed the auto sector as an important source of employment opportunities for Iran's blue-collar workers.

This case study informs the resource-curse literature that industrial development can be successful even in a resource-based economy, if the incentive structure is in place. Iran is the only rentier state compared with others (i.e. Norway, Saudi Arabia, Venezuela, etc.) that has been able to oversee such a large and dynamic industrial sector and hence, relatively diversify its economy. Future research should investigate the mechanisms to reduce the quality gap with international brands for countries such as Iran that succeeded to develop an indigenous auto industry with high local content. Additionally, given the importance of electric vehicles in being more environment friendly (compared with the gas-powered vehicles), future research should investigate how Iran can mobilize its technical capacity to manufacture more environment-friendly vehicles such as electric automobiles.

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Data Availability Statement

The data that support the findings of this study are publicly available at International Organization of Motor Vehicle Manufacturers (OICA) production statistics (http://www.oica.net/category/production-statistics/2011-statistics/), Iran Statistical Center (https://www.amar.org.ir) as well as Iran Data Portal housed at Syracuse University (http://irandataportal.syr.edu/labor-force).

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