

The Economic Complexity of the UAE: Diversification into Goods and Services

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About the Growth Lab

The Growth Lab's multidisciplinary team, led by Professor Ricardo Hausmann, pushes the frontiers of research on economic growth and development policy. The Growth Lab advances academic research on the nature of economic growth and conducts applied, place-based engagements that aim to understand context-specific growth processes, address key constraints, and identify promising opportunities. Key frameworks developed at the Growth Lab include Growth Diagnostics and Economic Complexity. Growth Diagnostics is a systematic methodology that aims to identify the most binding constraints to better growth outcomes, allowing policymakers to take the most impactful actions. Economic Complexity is a growing field of research that sees the economy as composed of distributed knowledge and productive capabilities that must be networked in order to be used in production and sees growth as the expansion of both the underlying knowledge and its uses. Through its research and teaching activities, the Growth Lab has become a global thought leader offering breakthrough ideas, methods, and tools that help policymakers, stakeholders, and scholars find ways to accelerate economic growth and expand opportunity across the world.

Acknowledgements

This report was produced in the context of the ongoing collaboration between Harvard's Growth Lab and the Ministry of Economy of the United Arab Emirates (UAE), which aims to produce novel research-based inputs to inform an ambitious, forward-looking economic policy agenda. The goal of this collaboration is to provide rigorous research that can support the Ministry of Economy and related policy-making entities in their mission of promoting high-quality, sustainable growth and fostering structural transformation in the UAE. All opinions, findings, conclusions, and recommendations expressed in this report are the authors' sole responsibility.

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1. Executive Summary

An existing record of successful economic diversification

Over the course of a few generations, and especially in the last 20 years, the UAE transformed into one of the most modern economies in the world. This is the result of a strong and sustained macroeconomic performance, but also owes to a successful diversification trajectory. In that sense, while oil continues to play a significant role in the country's economy and export basket, a downward trend in its relative importance is noticeable, illustrating the ongoing export-led diversification process. Non-oil goods exports have been expanding, growing 7.7% per year over 2005-19. Their diversity has improved in relative terms, closing the gap on that metric with countries like Australia and Norway but still lagging some other aspirational peers. This positive performance has been partly based on the expansion of stone and metals products, many of which however remain energy-intensive. Services exports have proven an even stronger engine of diversification. They have expanded by a factor of 3.5 over the last 14 years, or at 9.7% per year. Part of this success relies on activities related to transport and logistics, including some related to the re-export of goods. Travel and tourism are other major successes. Overall, more than half of total exports growth over 2005-2019 can be explained by the services (34%) and stone (19%) sectors.

Limitations of the current diversification model and new risks

Building on this strong past performance, the UAE could reap additional economic and social benefits from transitioning further towards a more diversified and sustainable economic structure. The current export matrix not only continues to be energy-intensive but also displays relatively low levels of economic complexity. Economic complexity reflects the amount of knowhow that is embedded in the productive structure of an economy; therefore, is strongly correlated with income and growth. However, the UAE exhibits an aggregated level of complexity lower than that of its peers, although most of them are also highly concentrated in oil or some other commodity (which usually hurts complexity metrics). The low level of relative complexity of the UAE is explained, on the one hand, by the low relative share of exports in overall “high-complexity” sectors, and, on the other, by the low level of sophistication that it shows within each sector. Although the country has been able to add new more complex products to its export basket, at the same time it has also reduced exports in products that show even higher levels of complexity. On the services side, the data is highly aggregated in a reduced number of categories, making interpretation of complexity metrics difficult. Overall, the country seems to have specialized in sectors (such as travel and transport) that seem to be –on average- of relatively low complexity.

A systematic approach to uncovering potential opportunities for further diversification

In this context, this report provides policymakers with elements of a roadmap to inform on how to strengthen the ongoing diversification process. To this end, we suggest components of a country-specific path for productive diversification, identifying products and industries with high potential in the UAE (in terms of both complexity and demand). The sector identification process –which is different for goods and services, given data constraints- is largely anchored around the economic complexity theory. Arguing that a country will diversify by moving from the products and services it already produces to others that require a similar set of assets and knowhow, we place a large weight on density to assess feasibility. In essence, density measures how close (or far) the country is from producing a product or industry. Despite its strong theoretical and practical foundations, economic complexity is only one of several possible approaches to approximate diversification paths. Therefore, we encourage policymakers to refine and improve the results of this exercise through iterations with relevant stakeholders and the authorities responsible for leading productive diversification efforts.

The UAE’s path to structural transformation may be steeper than for most peers (as suggested by its low Complexity Outlook Index), calling for an active policy stance geared towards the progressive accumulation of productive capacities, well-targeted “long jumps”, and strengthening state capacity to sort out the market failures associated with the process of self-discovery. To that end, following a rigorous sector identification process, we identify as diversification opportunities a total of 63 products and 18 service industries, across both the intensive and extensive margins. To facilitate policy efforts, we have organized the resulting set of products and industries with high potential to lead productive diversification in the UAE into ten diversification themes, five for services and five for goods. Each of these themes shows promise through growing global demand and/or the UAE’s existing capabilities in the industry or related activities. The themes are the following:

Section	Themes
Services	ICT
	Financial Services
	Business Services
	Healthcare
	Creative Industries

Goods	Food
	Metals
	Chemicals
	Plastics
	Machinery

Further opportunities in goods production around existing areas of strength

Five sectors were identified as potential promising areas of diversification in goods production. Food and beverage manufacturing is already a key sector in the UAE's economy and is expected to grow rapidly in the coming years, as local and foreign investors are establishing new production facilities and launching new products to meet growing demand in the domestic and regional markets. Products in the metals and materials theme are important to the UAE given their application to sectors such as construction, engineering, and energy, in which the country has developed a comparative advantage. In chemicals, the UAE may be able to leverage a competitive advantage due to its abundant natural resources, strategic location, and supportive infrastructure. Chemical products have high demand in various industries such as textiles, cosmetics, pharmaceuticals, and research. Plastics and rubber materials are crucial components in a wide range of industries, such as automotive, construction, packaging, and consumer goods, owing to their versatility, durability, and cost-effectiveness. The country's abundant hydrocarbon resources provide a competitive advantage in the production of raw materials for plastics and synthetic rubber. Finally, the products in the machinery and vehicles theme provide physical capital and inputs to various industries and sectors, including transportation, agriculture, defense, and manufacturing, which highlights its significance to the UAE's economic development and diversification efforts, while contributing to some to the country's sovereignty and strategic agenda.

Broad opportunities in high-value-added service activities

Five sectors were identified as potential promising areas of diversification in services. ICT is key to enabling the country's vision of building a competitive, high-productivity economy. In turn, the business services theme is especially important for the UAE as it looks to establish itself as a hub for regional headquarters of global companies. As for the financial services theme, it contributes to the robust financial ecosystem that underpins the nation's economic diversification efforts and its vision to become a regional and global financial hub. The growth of specialized healthcare services would support the country's ambition to become a regional medical tourism hub, which would allow it to draw patients

from neighboring countries and its most important trading partners. The creative industries and tourism sector in the UAE are closely linked and mutually beneficial. The creative industries contribute to the cultural diversity, social cohesion, and economic development of the UAE, while the tourism sector provides a large and diverse market for the creative industries, as well as infrastructure and support services.

2. Introduction

Building on strong past economic performance, the UAE could reap additional economic and social benefits from transitioning further towards a more diversified and sustainable economic structure. The UAE has already experienced transformative growth and emerged as a key player in the region and beyond. However, the country has set yet more ambitious goals for its society and its economy. Meanwhile, the world is also changing rapidly, foregrounding the decarbonization agenda and the race towards technological innovation. In this context, diversifying further towards high-value economic activities that fit the productive capabilities of the UAE is essential.

Based on the theory of economic complexity, this report identifies themes that may have high potential to drive growth in the UAE towards more a diversified and more sophisticated economy while recognizing the importance of building on existing successes. The economic complexity paradigm provides a solid base for identifying opportunities with high potential for export and productive diversification: it pinpoints the existing set of knowhow, skills, and capacities as signaled by the goods and services that the UAE is currently able to produce, and uncovers existing and latent areas of comparative advantage that can be developed by redeploying those.

The analytical frameworks used in this report have also been customized to the specific case of the UAE. Special attention was dedicated to service activities, which have been growing in importance within the country's economy and are likely to continue to play an important role in economic diversification. Other important areas of methodological innovation related to the improvement of existing data sources. Various sources of export data were triangulated to provide the best possible picture of UAE exports, distinguishing clearly between domestic exports (*i.e.*, “actual exports”) and re-exports. The several existing economic registries were also datamined and merged with international data sources through a systematic algorithm to create the most detailed view of employment by fine economic activities in the UAE.

Eventually, this report identifies products and activities with high export potential and organizes them into groupings or “themes”. The general goal is to provide elements towards a diversification roadmap that will help UAE policymakers achieve a path of high, stable, and sustained growth that is consistent with its comparative advantages, its policy goals, as well as global trends. While high-potential themes are an important starting point for such a diversification roadmap, additional work remains to be done. To that effect, Harvard's Growth Lab is continuing to collaborate with the Ministry of Economy on a range of concrete policy areas that underpin that diversification drive, including the tools to effect economic diversification, research and innovation, trade and investment, green growth, and others.

This report is organized into seven sections, including the preceding executive summary and this brief introduction. Section 3 explains the methodology of economic complexity, including its main concepts, as well as the adjustments that were required to incorporate service activities into the analysis. Section 4 summarizes the export diversification trajectory of the UAE, intending to highlight its past and current productive capacities. Section 5 explores the country's complexity profile, as well as the main drivers behind the high-level summary indicators. Section 6 identifies industries with high export potential, based on relevant feasibility and attractiveness factors, grouping them into cohesive themes. Section 7 concludes by summarizing the main findings of this report and discussing selected policy implications.

3. Conceptual Framework on Economic Complexity

This section describes the conceptual framework underpinning this report's analyses. In the first sub-section, we recall the main concepts of the economic complexity paradigm, outlining the general philosophy of the approach and introducing some of the main complexity metrics. The second sub-section presents some of the improvements and adaptations that have been made in the specific case of the UAE.

3.1 Theory of Economic Complexity

The theory of economic complexity, introduced by Hausmann *et al.* (2014), is based on the realization that the development of products and services not only requires raw materials, labor, and machinery but also tacit knowledge (or “knowhow”) of how to put inputs together to produce things and run business operations. This tacit knowledge tends to be the limiting factor for diversifying economic activities because it is the most difficult component of production to transfer. Whereas many other inputs to production – including materials, tools, and blueprints – are relatively easy to trade and transfer, tacit knowledge can only be acquired slowly through experience. Moreover, since complex economic activities demand a diverse set of skills, modern economies require that individuals know different things and that markets function in a way that allows firms to organize human capital for production. As a result, the process of economic development is slow because the accumulation of diversified private sector knowhow requires coordination across teams and organizations.

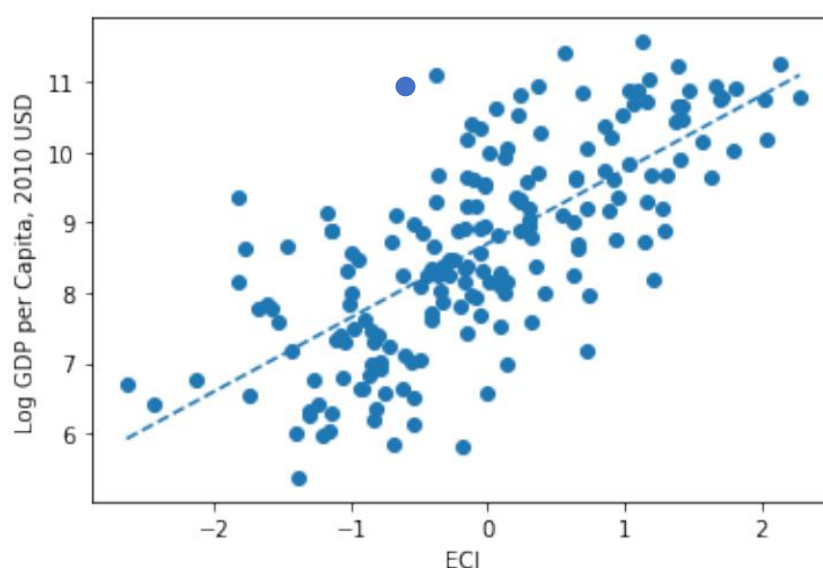
Some products and services incorporate large amounts of knowhow and are the result of complicated interaction networks. In contrast, others incorporate much less knowhow and require simpler networks. As an analogy, different products and services can be thought of as “words” whose production requires “letters” (knowhow-based capabilities), like in a game of Scrabble. The production of long and sophisticated words requires many letters, while few are needed to generate short and simple words. Places differ in both the quantity and quality of agglomerated knowhow. While some places have many and very diverse letters, which they can easily combine to form long words; others have very few, which limits the possibility of creating new words. Moreover, the differences in productive capacities caused by uneven “endowments” of letters are further amplified by the fact that the number of words that can be constructed increases exponentially as new letters are added.

Ultimately, places develop the products and services (words) that their knowhow-based capabilities (letters) can support. Therefore, by observing patterns of production across places and time, we can infer and mathematically construct quantitative measures that capture how much knowhow a place possesses (Economic Complexity Index, ECI), and

how much knowhow specific products require (Product Complexity Index, PCI). Places with a high ECI are able to support a diverse set of economic activities, including activities that are not common across places. In turn, places with a low ECI can only support a few activities, which tend to be ubiquitous across places. This inverse relationship between diversity and ubiquity is observed empirically across countries, states, and cities.

Given that economic complexity reflects the amount of knowhow that is embedded in the productive structure of an economy, it is not surprising to find a strong correlation between measures of complexity and income. Figure 1 shows the relationship between per capita income and economic complexity across all countries of the world.

Figure 1: Income per Capita and Economic Complexity (2017) - All Countries



Source: Own elaboration based on World Bank WDI and the Atlas of Economic Complexity

The general implication is that long-term growth and corresponding improvements in wellbeing tend to require a process of structural transformation where the country gradually gains productive capabilities. This allows the revealed comparative advantages of the economy to evolve and diversify over time. Countries that have transitioned from low-income to high-income economic systems have tended to diversify from primarily agricultural production into particular types of labor-intensive manufacturing (like garments) and onward to more sophisticated manufacturing and tradable services. As they grow, they do not give up most of the economic activities of the past but rather become more productive in those activities as they add new industries. This diversification process usually leads to rising wages across both old and new industries and makes countries more resilient to a variety of shocks – whether natural, macroeconomic, financial, or technological – as economic activity and jobs are less concentrated and therefore less vulnerable to a single shock.

For countries that find themselves above the regression line, some specific implications are also relevant. Many of these countries benefit from substantial resource wealth and, as a result, they stand to benefit from recognizing the risk inherent with resource-driven wealth: if the resources lose their value, national wealth will contract. Additionally, some of these countries struggle with the subnational implications associated with these types of economies. For instance, stabilization mechanisms that work well at a national level, may not work as well at a subnational level. They also often struggle to share the benefits of that wealth, as in many instances rents from natural resources do not always translate into long-term material benefits for places they were extracted from. Finally, countries blessed with natural resource wealth face challenges for diversification of job opportunities that derive from the distorting macroeconomic influences that natural resources can have. Such countries may want to develop strong institutions that diminish the negative impacts of resource wealth, including a tendency toward inequality and boom-and-bust cycles. Likewise, they can also benefit from actively pursuing economic diversification as a means for resilience and inclusiveness.

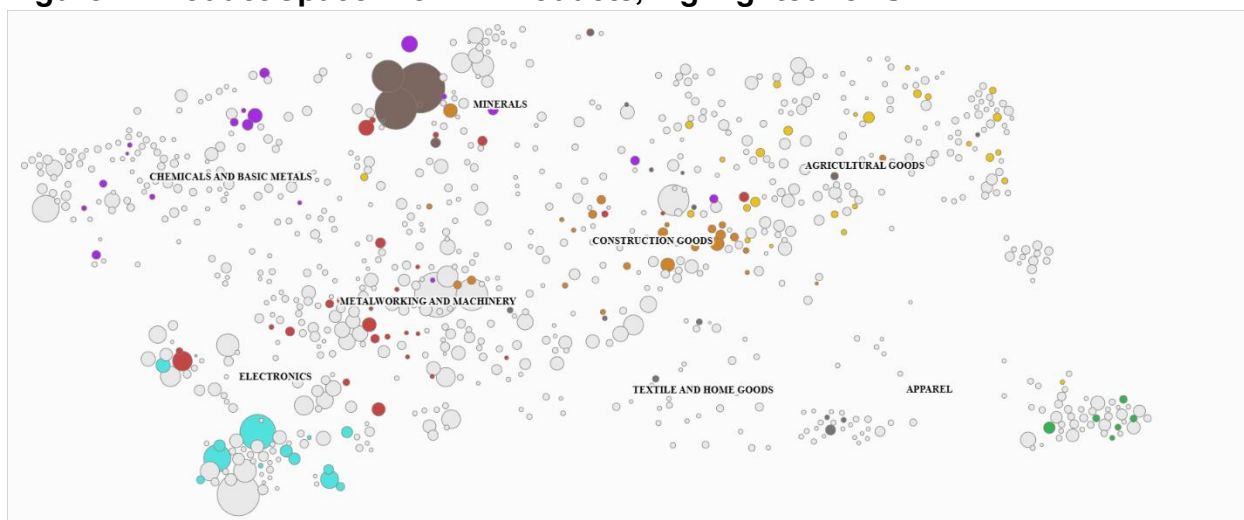
As argued, the process of economic development involves countries diversifying from the production of simple goods and services to more complex ones, in a sequence often referred to as “structural transformation”. Hausmann and Klinger (2006) show that producing new goods and services is different from producing more quantities of those already produced. Specifically, the assets and capabilities needed to produce one good or service are imperfect substitutes for those needed to produce others, and the degree of substitutability varies. Correspondingly, the probability that a country develops a new industry is related to its existing production capabilities in other similar industries. New capabilities will be more easily accumulated if they can be combined with others that already exist. An implication of this is that a country will diversify by moving from the products and services they already produce to others that require a similar set of assets and knowhow.

Based on this idea, Hausmann and Klinger (2006) proposed a metric of similarity between products. In essence, they measure the distance between each pair of products through the probability that countries intensively export both. The collection of all the resulting proximities can be visualized as a network that connects pairs of products based on their tendency to be co-exported by countries. They refer to this network as the Product Space and use it to study the productive structure of countries. As can be seen in Figure 2, the Product Space is highly heterogeneous. Some sections are composed of densely connected groups of products, whereas others are more loosely connected. This heterogeneity has significant implications for the speed and patterns of structural

transformation: the ability of countries to diversify and to move into more complex products is crucially dependent on their initial location in the Product Space.

The location of a country's production in the Product Space captures information regarding both the productive knowledge that it possesses and the capacity to expand that knowledge by moving into other nearby products. The strategic positioning of a place in the Product Space can be leveraged as an insightful tool for formulating economic diversification strategies.¹ This tool is equally applicable for both developing countries seeking to accelerate structural transformation and industrialized countries that want to diversify beyond their natural resources. What differs is the initial position in the Product Space for the countries and the type of strategies that result. Finally, Box 1 summarizes the main concepts from the economic complexity theory.

Figure 2: Product Space with All Products, highlighted for UAE



Source: The Atlas of Economic Complexity

Box 1: Main Concepts in Economic Complexity

A description of several of the main variables in economic complexity methodology follows. It is important to bear in mind that apart from Revealed Comparative Advantage (RCA) and diversity, all these measures are normalized indices that carry ordinal but not necessarily cardinal meaning. That is, the order of values may matter, but it may be meaningless to interpret the precise numerical value of an index. For instance, if one product has a higher PCI value than another it likely requires more specialized knowhow that is more useful for economic diversification. However, one ought not to read too much into the precise numerical values of

¹ Harvard CID's Growth Lab developed a free, online tool for Product Space analysis of any country in the world. See <http://atlas.cid.harvard.edu/>. This report significantly improves on the publicly available information, notably by implementing country-specific data corrections, integrating services exports into the product space and implementing a country-specific prioritization algorithm. Some of these improvements are described in the next sub-section.

these indices. For simplicity, these concepts are explained in terms of products, but they can apply to services as well.

- *Revealed Comparative Advantage (RCA)*: This is a place-product measure that captures the relative importance of a product in a place. Following the methodology of Balassa (1964), it is usually calculated as the ratio between the proportion of the product in the export basket of a place and the proportion of the product in world trade. If this relationship is greater than one, the place has a “revealed comparative advantage” in that product, which is equivalent to saying that the place produces the product more intensively than the rest of the world.
- *Diversity*: This is a place-specific measure that is simply the total number of products or industries for which a place has an RCA greater than one. This is, therefore, very similar to the colloquial meaning of the word, but in this and other complexity reports diversity captures a measurable quantity that can be compared from one place to another. The diversity of a place captures how many different economic activities are present but does not have anything to say about the sophistication or the complexity of those activities. Higher diversity tends to be better for an economy because it implies less concentration in a few activities that can experience a negative shock at the same time. It also tends to be better for individuals because it implies more freedom to pursue different career opportunities.
- *Product Complexity Index (PCI)*: This is a product-specific measure that ranks the diversity and ubiquity of the productive knowledge required for its production. It is determined by the average diversity of countries that make the product, as well as the average ubiquity of the other products that these countries make. The most complex products (that only a few, highly complex countries can produce) include sophisticated machinery, electronics, and chemicals. Meanwhile, the least complex products (that nearly all countries, including the least complex, can produce) tend to be common agricultural products and some raw materials.
- *Economic Complexity Index (ECI)*: This is a place-specific measure that captures how complex a place’s production/export basket is. It is calculated as the average PCI of those products in which the place shows an RCA equal to or greater than one. Therefore, it reflects how much productive knowhow a place possesses. The most complex countries (that are highly diversified and able to produce products that only a few, highly complex countries can produce) include Japan, Switzerland, South Korea, and Germany. Meanwhile, the least complex countries (that are concentrated in a few products that most countries in the world can produce) include Guinea, Angola, Burkina Faso, and Nigeria. ECI should not be confused with diversity; while diversity is the number of products in which a place has an RCA greater than one, ECI takes into account the PCI of each of those products.
- *Distance*: This is a place-product measure and corresponds to the sum of the proximities connecting a new good to all the products that the country is not currently exporting. This value is normalized by dividing it by the sum of proximities between the new product and all other products. In turn, proximity is a product-product measure that is calculated as the minimum conditional probability that a country intensively exports one product given that it already intensively exports the other. Thus, if a country exports most of the goods connected to a product, then its distance to it will be short (close to zero). However, if the country only

exports a small proportion of them, then its distance to it will be large (close to one). Density, in turn, is the inverse of distance (1-distance).

- *Complexity Outlook Gain (COG)*: This is a place-product measure that quantifies the extent to which a location could benefit in opening future diversification opportunities by developing a particular product. Complexity outlook gain quantifies how a new product can open links to more, and more complex, products. Complexity outlook gain classifies the strategic value of a product based on the new paths to diversification in more complex sectors that it opens up. Complexity outlook gain accounts for the complexity of the products not being produced in a location and the distance or how close to existing capabilities that new product is.
- *Complexity Outlook Index (COI)*: A place-specific measure that evaluates how many complex products are near a place's current set of productive capabilities. The COI captures the ease of diversification for a place, where a high COI reflects an abundance of nearby complex products that rely on similar capabilities or know-how as that present in current production. Complexity outlook captures the connectedness of an economy's existing capabilities to drive easy (or hard) diversification into related complex production. A low complexity outlook indicates that a place has few products that are a short distance away, so it will be difficult to acquire new know-how and increase its economic complexity.

3.2 Methodological and Data Considerations

Economic complexity calculations have usually relied on international data on the trade in goods, chiefly because it allows for a rich cross-country comparison. The United Nations Statistical Division (COMTRADE) dataset used and improved upon in the Atlas of Economic Complexity includes detailed cross-country information linking countries to the products that they produce in a standardized classification. As such, it offers great advantages, but it does have limitations. First, it includes data on exports, not production. Countries may be able to make things that they do not export. However, the fact that they do not export them may still suggest that they may not be very efficient in their production. Countries may also export small amounts of a product, which does not reflect a true productive capability. To circumvent this issue, we require that countries export more than a "fair share" of a product to identify that product as productive capability for that country (as is visible in the explicit definitions of some of the complexity measures outlined in Box 1). Finally, countries may also export things they do not make, or export products for which domestic production contributes only a small share of the total value of the product. This is an especially salient issue in countries with a large re-export activity, like the UAE. To address this issue, in this report, we exclude re-exports from the country's export basket.

At the same time, because the COMTRADE data is collected by customs offices, it includes only goods and not services. Given the lack of standardized export data for services with sufficient industrial disaggregation at an international level, economic

complexity analysis has traditionally focused exclusively on goods. However, this is an important drawback, as services are becoming a rising share of international trade. To account for this gap, in previous projects, the Growth Lab has implemented different types of approaches to perform complexity analysis inclusive of services, based on the available datasets in each country². In addition, the economic complexity theory has also supported numerous efforts to identify productive capabilities at the sub-national level and the most attractive opportunities for structural transformation including both goods and services. To increase international comparability, the Growth Lab has more recently used the Dun & Bradstreet (D&B) database, which has representative employment information with broad international coverage and high geographical and industrial disaggregation for both goods and services³. In doing so, some significant cleaning of the data and adjustments to the original methodology was required. Unfortunately, in the case of the UAE, D&B data quality is particularly poor, making it a useless source of data even after extensive cleaning, correction, and machine learning imputations.

Understanding that the complexity analysis for the country had to incorporate services, we found ourselves in the need to innovate once again and incorporate different adjustments to our methodology. Hence, for this project, we use for the first time the services trade data that the World Trade Organization (WTO) has made available in collaboration with the OECD (Balanced Trade in Services).⁴ This dataset is jointly produced with UNCTAD and is sourced from the IMF, Eurostat, OECD, and national sources.⁵ We validate this data against the World Development Indicators (WDI) data for peer countries and the broad balance of payment figures for the UAE. Since the WTO data includes information for several years (2005 onwards) on bilateral trade by service category, we use it to have a more complete overview of the UAE's diversification trajectory in Section 3, as well as of the evolution and relative performance of the country's economic complexity in Section 4.

Despite presenting multiple advantages, the WTO data has an important downside: the relatively high level of aggregation of the data. Exports are reported under the following 12 broad services categories:

² Early efforts were made by Hausmann, *et al.* (2017) in Panama, taking advantage of the comprehensive nature of the population census in that country. Other attempts at representing a product space including services are to be found in the Colombian Atlas of Economic Complexity and the Mexican Atlas of Economic Complexity.

³ Previous projects in which economic complexity analysis has relied on D&B employment data include Jordan (Hausmann *et al.*, 2019), Buenos Aires (Hausmann *et al.*, 2020), and Western Australia (Hausmann *et al.*, 2021).

⁴ In the Atlas of Economic Complexity, we have included data on trade in services, which is collected by the IMF and is obtained from the World Development Indicators (WDI). This data allows for consistent cross-country comparison but only at a highly aggregated classification. In any case, data for the UAE is not available from this source.

⁵ The WTO does a balancing exercise across countries to concord bilateral exports. In some cases, exports are estimated, not reported.

1. Manufacturing services
2. Maintenance and repair services n.i.e.
3. Transport
4. Travel
5. Construction
6. Insurance and pension services
7. Financial services
8. Charges for the use of intellectual property n.i.e.
9. Telecommunications, computer, and information services
10. Other business services
11. Personal, cultural, and recreational services
12. Government goods and services n.i.e.

As an example, the “Other business services” category includes a wide range of services that include R&D services; professional and management consulting services; and technical, trade-related, and other business services. This last sub-category, for instance, includes architectural, engineering, scientific, and other technical services; waste treatment and de-pollution, agricultural and mining services; operating leasing services; and trade-related services. For these more disaggregated categories (which we may still consider relatively aggregated), no export data is provided. Therefore, it is not possible to estimate their relative ubiquity and complexity, the proximity between each of the services, or, in other words, the UAE's detailed productive capabilities.

To provide more detailed guidance about the most attractive development and diversification opportunities available for the UAE, in Section 5 we take a two-pronged approach, separate for goods and services, each relying on different sources.

For the case of goods, to take advantage of the virtues of the traditional application of the economic complexity methodology (focus on tradable, international comparability, high sectoral breakdown), we use COMTRADE exports data to estimate UAE's comparative advantages, as well as the complexity metrics described above (distance, PCI, and COG). In this sense, the major difference with respect to the classic approach is that, for this project, UAE exports (and those of its peers) are approximated by the imports reported by trade partners. These additional adjustments allow us to solve issues with the reporting of re-exports and oil exports and, therefore, better infer relative comparative advantages as reflected by domestically reported export figures.

In the case of services, given the lack of disaggregated international exports or employment data with good coverage for the UAE, we opt for an alternative and novel approach. It involves estimating industry employment in the UAE based on data coming from the National Economic Registry (NER) and ORBIS, a database containing detailed

information on millions of companies across the globe. This time-consuming and highly quantitative process entailed associating an industry code to each of the companies on the register based on their business description, using natural language processing techniques, and then matching these companies to the ones included in ORBIS to obtain their employment figures. When firm employment was not available in ORBIS, it was imputed based on the average firm employment for the corresponding industry and size-section in the United States (USA) and adapted for the UAE aggregate employment figures (see Annex 1 for more details).

Additional methodological adjustments were needed in order to use employment information instead of export data to capture the relative intensity of different economic activities. This employment-based analysis utilizes the same concept of revealed comparative advantage (RCA) as the export-based analysis but uses employment totals rather than export values to measure relative intensity. In the export-based approach, the reference has always been the entire world (also the case in this project for goods). This is possible because international trade data is comprehensive and representative of all countries and products. Instead, for the employment-based analysis, due to the data limitations previously described, we choose the USA as the reference, as it has the best available information and can be considered as an approximation of the technological frontier. We also use employment data from the USA to calculate the proximity between industries. For this purpose, we focus on employment by industry at the city level. The selection of cities as the analysis unit has the important advantage of allowing a sufficient degree of variability while considering economic areas of relevant size.⁶

The resulting custom-made employment space allows us to explore UAE's productive capabilities including both goods and services. It has the advantage of providing a highly granular industry disaggregation that allows us to explore connections between all industries. However, it does have several limitations. First, the data source does not allow us to observe changes in productive capabilities over time. Second, it implicitly assumes that the combination of capital and labor used to develop a certain industry is relatively similar in USA cities and the UAE. Third, the intensive presence of an industry can sometimes indicate very high local demand for a (non-tradable) service rather than especially competitive capabilities to produce the service. Fourth, these elements make it irrelevant to calculate complexity metrics for individual industries like those that can be computed for individual products based on export data. As detailed in Section 5, we will approximate their relative sophistication based on alternative indicators.

⁶ To only consider sufficiently large economic areas, we exclude cities that have less than 500,000 inhabitants.

At the same time, it is worth noting that although the employment-based analysis includes goods and services, tradable and non-tradable alike, we narrow the universe of industries to prioritize tradable services. As argued before, goods have their approach, which more closely follows the traditional approximation, allowing us to calculate all complexity metrics.. In any case, using the two approaches of export-based complexity for goods and employment-based complexity for services in parallel allows us to develop a rich understanding of productive capabilities and diversification opportunities in the country.

4. Economic Diversification in the UAE

As part of this report's effort to understand the engines of growth in the UAE and the perspectives they offer for future development, in this section we characterize the historical diversification process in the UAE. For this purpose, we mainly rely on trade data, as it allows for a rich cross-country comparison and a more stringent criterion to define the country's capabilities.⁷

4.1 UAE's Exports Basket and Dynamics

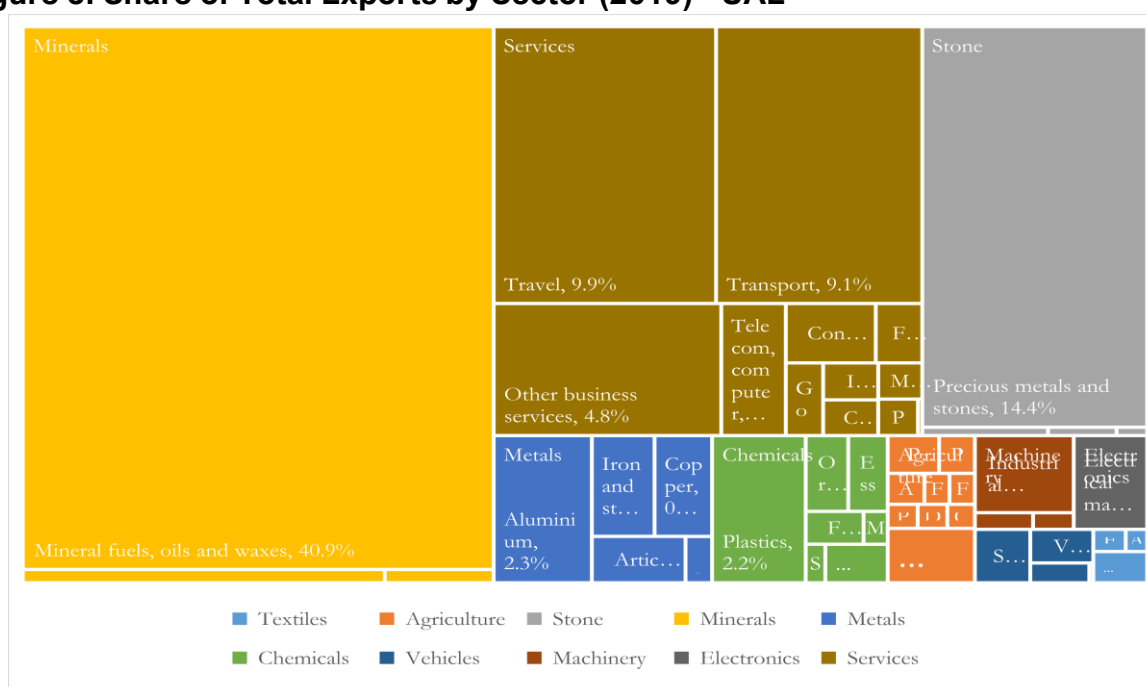
The broad structure of the UAE's export basket, including both goods and services, is shown in Figure 3. Not surprisingly, exports are heavily concentrated in minerals, which represent nearly 42% of total exports. At the product level, as can be seen in Figure 4, minerals exports are almost exclusively explained by crude oil, refined oil, and petroleum gases.⁸ Despite the significant role of oil in the country's overall export basket, other sectors are also large contributors to the UAE's current performance. In particular, the services and stone sectors account for a relevant 28% and 15% of total exports, respectively. In turn, exports of services are largely driven by travel, transport, and other business services, while those of stone by gold, jewelry of precious metals, and diamonds.⁹

⁷ The content of this section builds on and complements that of Chapter 4 of the Growth Report.

⁸ Based on its large resources, the UAE is a major oil exporter, representing a world market share of nearly 5% or higher in crude oil, showing an upward trend since 2010 and that may have reached close to 7% in 2019. Refined oil and petroleum gases exports are also large in relative terms, in both cases the UAE showing global market shares between 2% and 5%, with refined oil significantly increasing its world market share since 2014.

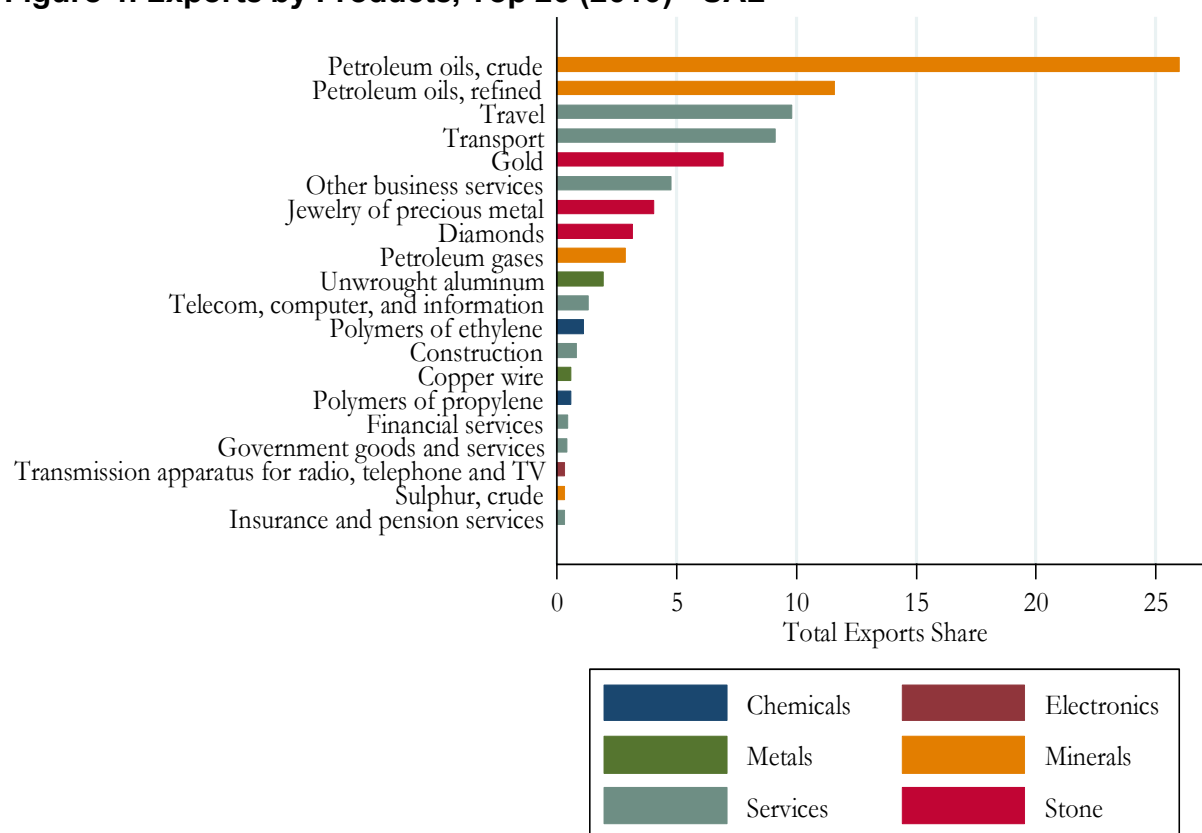
⁹ Regardless of the prevalence of re-exports in traded volumes, UAE exports of diamonds and jewelry of precious metals are also significant (as reflected in Figure 4).

Figure 3: Share of Total Exports by Sector (2019) - UAE



Source: Own elaboration based on COMTRADE and the World Trade Organization

Figure 4: Exports by Products, Top 20 (2019) - UAE



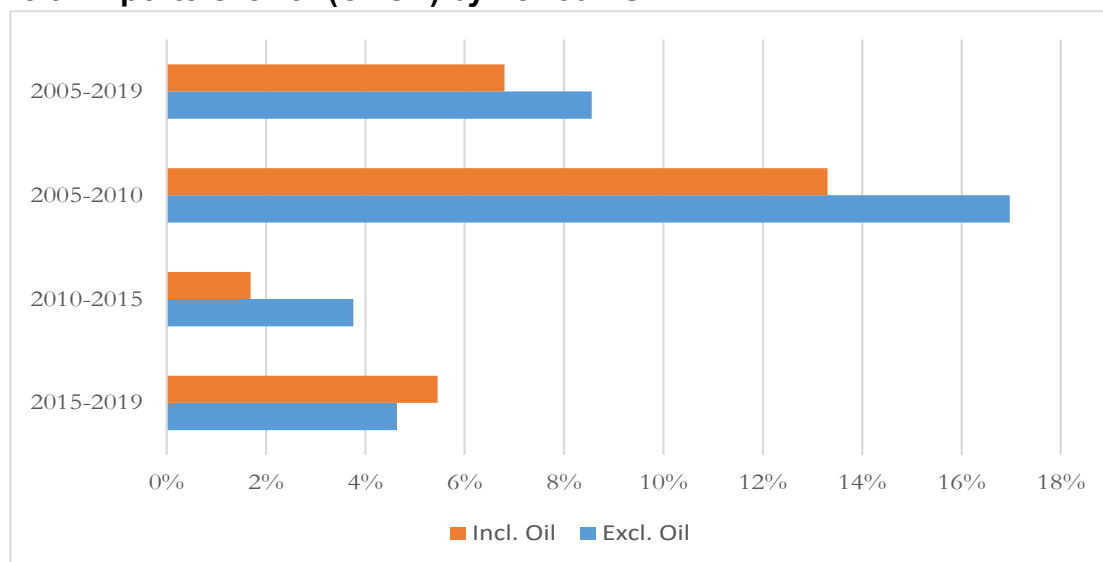
Source: Own elaboration based on COMTRADE and the World Trade Organization

UAE's total exports, including both goods and services, increased from USD 102 billion in 2005 to USD 257 billion in 2019, after peaking at USD 290 billion in 2014.¹⁰ This trajectory implies a compound annual growth rate (CAGR) of nearly 6.8% over a period of 14 years. This sub-section breaks down this growth in overall exports to deepen our understanding of the drivers behind the aggregate figures.

Although this positive growth in exports was relatively consistent throughout the period (aside from sharp declines in 2009 and 2015, and a more moderate one in 2019), it was particularly high in the period 2005-2010, as can be seen in Figure 5. During this period, the CAGR reached 13.3% and it was even higher (17%) if oil is excluded from the analysis. On the contrary, export growth was relatively low in the five years between 2010 and 2015, especially if oil is considered (1.7% including oil, 3.8% excluding it).

In terms of sectors, exports growth was mainly driven by minerals, services, and stone, which contributed 34%, 34%, and 19% to the total export growth between 2005 and 2019, respectively (Figure 6). At a more disaggregated level, 80% of the increase in exports can be explained by the evolution of five subsectors within these broader sectors: mineral fuels, oils and waxes (33%), precious metals and stones (19%), transport (12%), travel (11%) and other business services (6%). Five other subsectors account for an additional 10% of the growth. These sectors are plastics (3%), aluminum (3%), ICT (2%), copper (1%) and construction (1%).

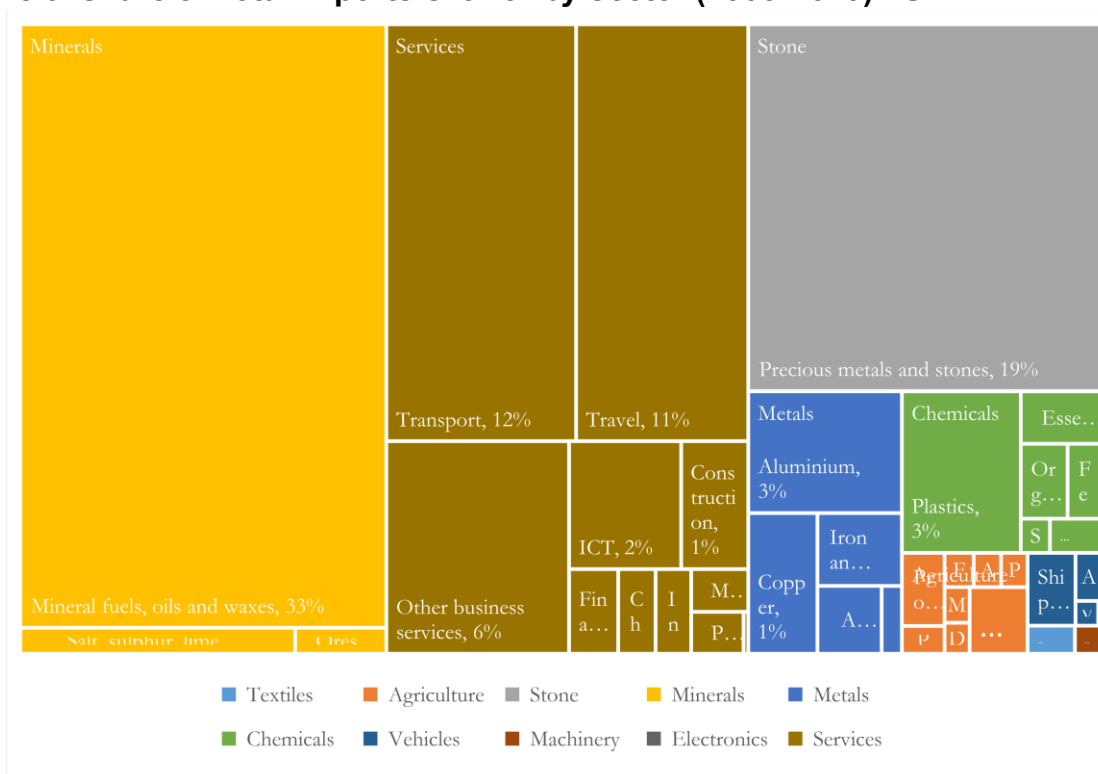
Figure 5: Exports Growth (CAGR) by Period - UAE



Source: Own elaboration based on COMTRADE and the World Trade Organization

¹⁰ To allow for a better distinction between domestic exports and re-exports, trade figures referenced in this report are often based on international figures reported by partner countries. As a result, they may differ from nationally reported figures.

Figure 6: Share of Total Exports Growth by Sector (2005-2019) - UAE

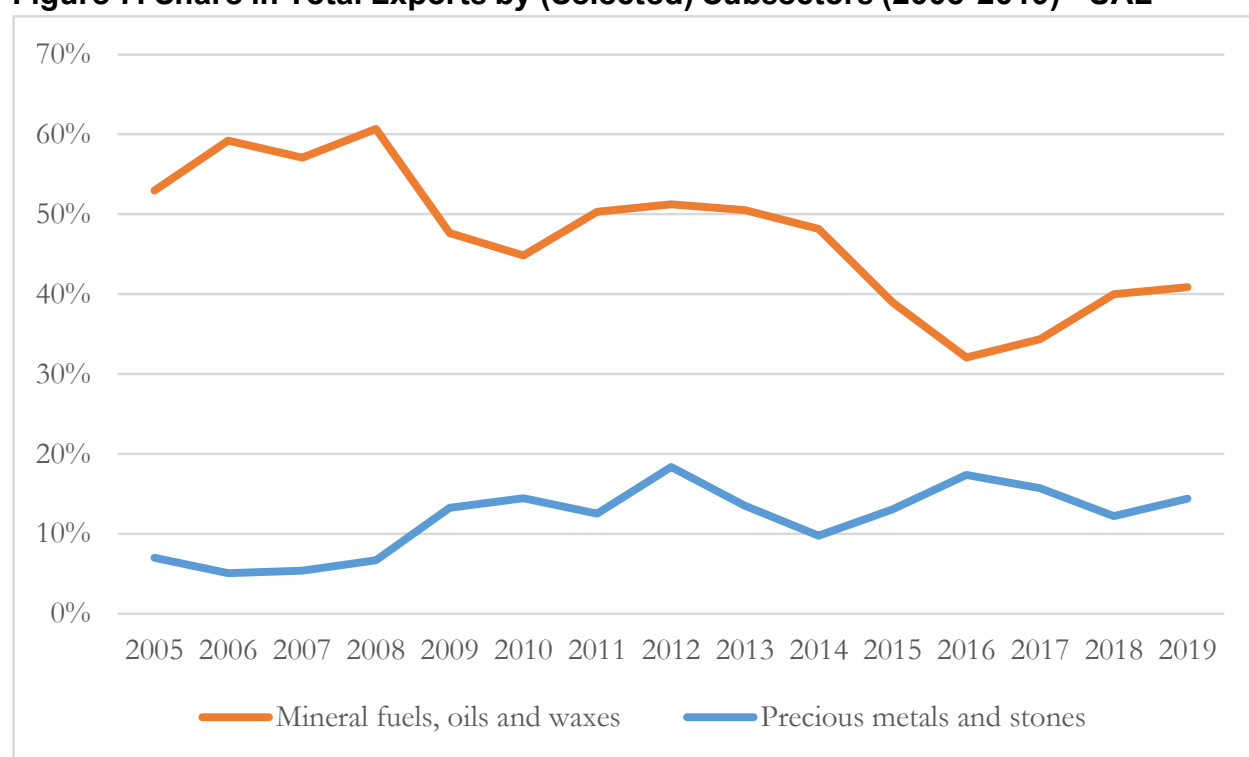


Source: Own elaboration based on COMTRADE and the World Trade Organization

The share of oil is declining overall. Although, due to its size, oil accounted for close to a third of the increase in exports, this does not mean that it grew faster than the rest of the export basket, as can be inferred from Figure 7. Specifically, mineral fuels, oils, and waxes expanded by 4.9% annually during the period 2005-2019, below the overall rate. Consequently, its share in UAE's total exports shows a downward trend. The opposite can be said about precious metals and stones -- which include gold, diamonds, and jewelry of precious metals, among the most relevant products for the UAE.¹¹ Despite explaining a lower percentage of the total increase in exports, its share in the country's exports doubled during the period, going from 7.0% in 2005 to 14.4% in 2019, as a result of experiencing a CAGR of 12.4% (Figure 7).

¹¹ Despite our best effort to remove re-exports from the data, it is not entirely clear to what extent these figures may still capture some level of re-exports or exports with low local value added.

Figure 7: Share in Total Exports by (Selected) Subsectors (2005-2019) - UAE

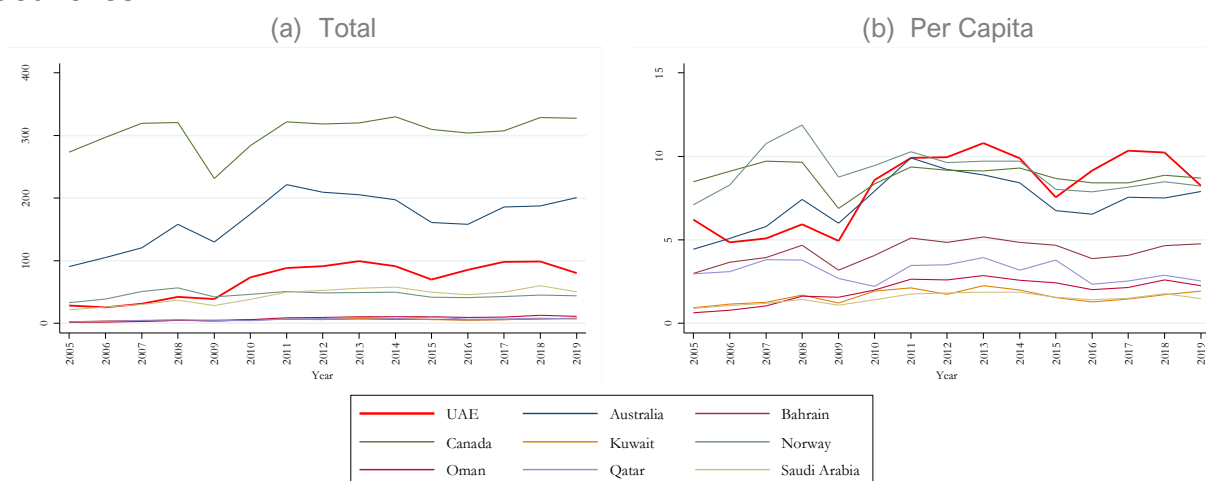


Source: Own elaboration based on COMTRADE and the World Trade Organization

In this line, for 2019, excluding oil exports means goods exports falling to less than half, from about USD 185 billion to USD 80 billion. This reduced level, however, translates into exports per capita of nearly USD 8,000, which places the UAE among the best-performing countries in the comparison group, showing levels comparable to those of successful diversifiers, such as Canada, Australia, and Norway, and well above those shown by regional peers. At the same time, it is worth noting the rise that non-oil exports have experienced since 2009, moving from close to USD 40 billion to USD 80 billion in 2019, after having reached nearly USD 100 billion in 2013, 2017, and 2018, as can be seen in Figure 8. This favorable evolution is based on a CAGR of 7.7% throughout the period, which is relatively high relative to peers.

Non-oil goods exports have expanded, driven by stone, metals and chemicals, which, nonetheless, raises concerns about the transition to a less energy-intensive economy, as implied by the results shown in Figure 9.

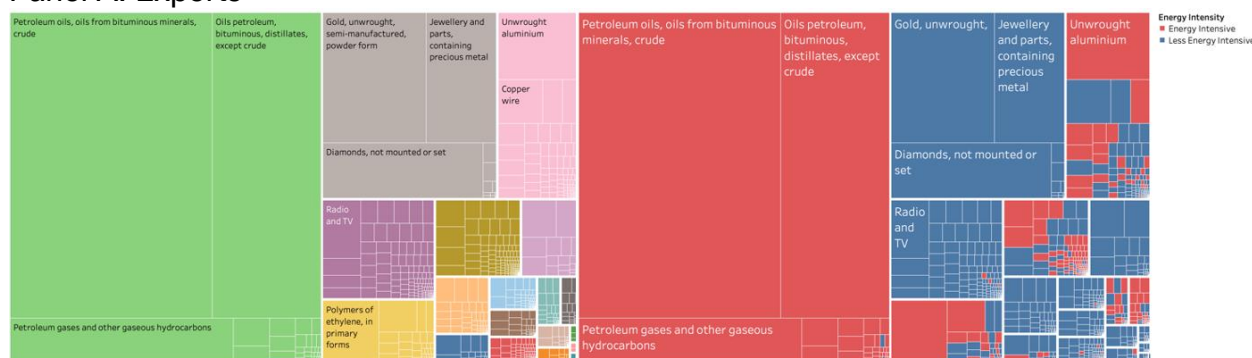
Figure 8: Value of Non-Oil Goods Exports (2005-2019) - UAE and Benchmark Countries



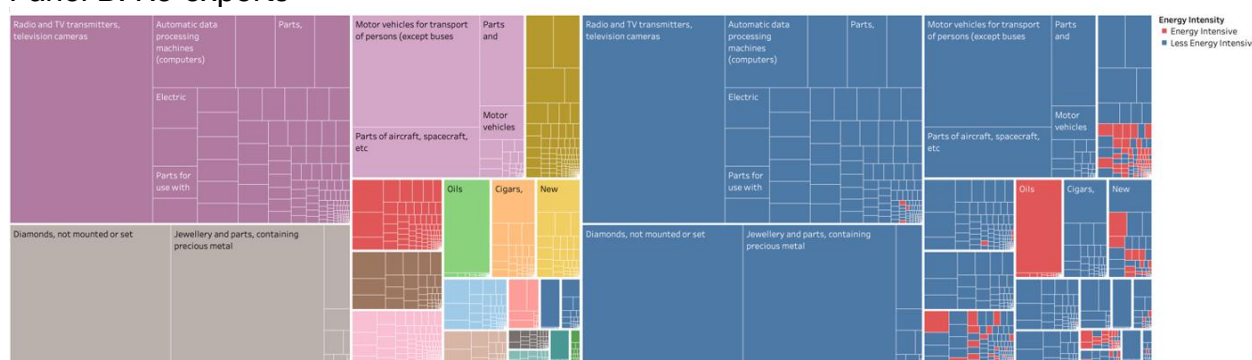
Source: Own elaboration based on COMTRADE

Figure 9: Exports and Re-exports by Energy Intensity (2019) - UAE

Panel A: Exports



Panel B: Re-exports



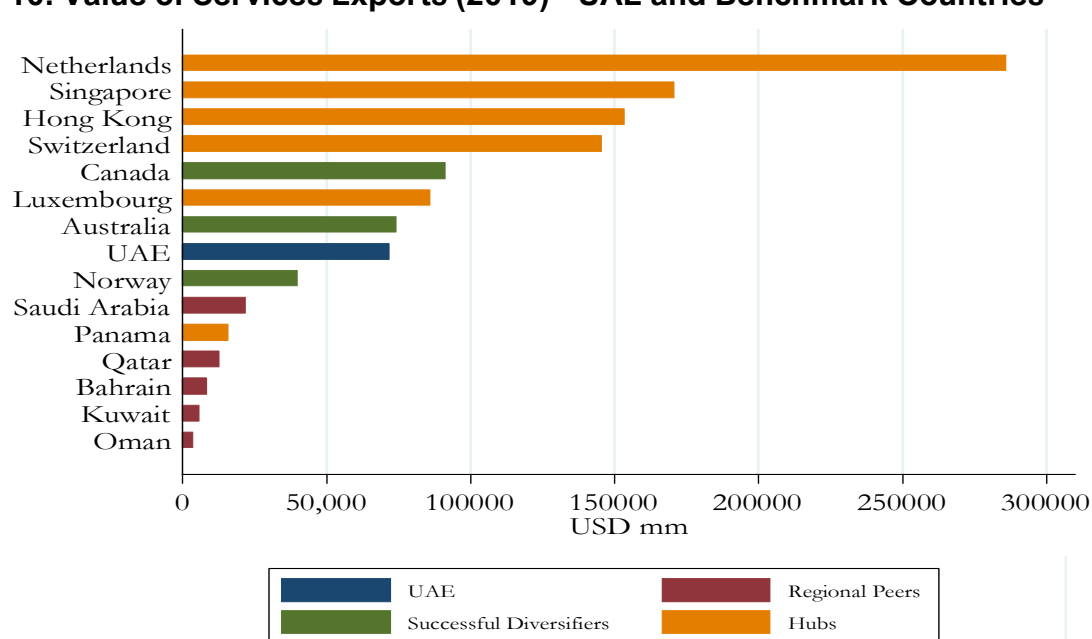
Source: Own elaboration based on COMTRADE and BEA input-output tables for 2012

4.1.1 A Deep-dive in Exports of Services

Services exports have proven to be an even stronger engine of diversification, building on a remarkable expansion path during recent years. The UAE exported around USD 70

billion in services in 2019 (Figure 10). This figure positions the country as a relevant player in international markets, widely surpassing its regional peers and showing levels similar to those of successful diversifiers. However, it is still relatively far from major international hubs such as the Netherlands, Singapore, Hong Kong, and Switzerland. Moreover, the UAE is the second country in the reference group with the highest services exports growth in the period, only below Qatar. During 2005 and 2019, service exports in the country increased by more than 3.5 times, going from just under USD 20 billion to just over USD 70 billion, a substantial increase that exceeds that shown by important hubs like Singapore and Hong Kong (Figure 11). This implies an impressive CAGR of somewhat less than 10%.

Figure 10: Value of Services Exports (2019) - UAE and Benchmark Countries



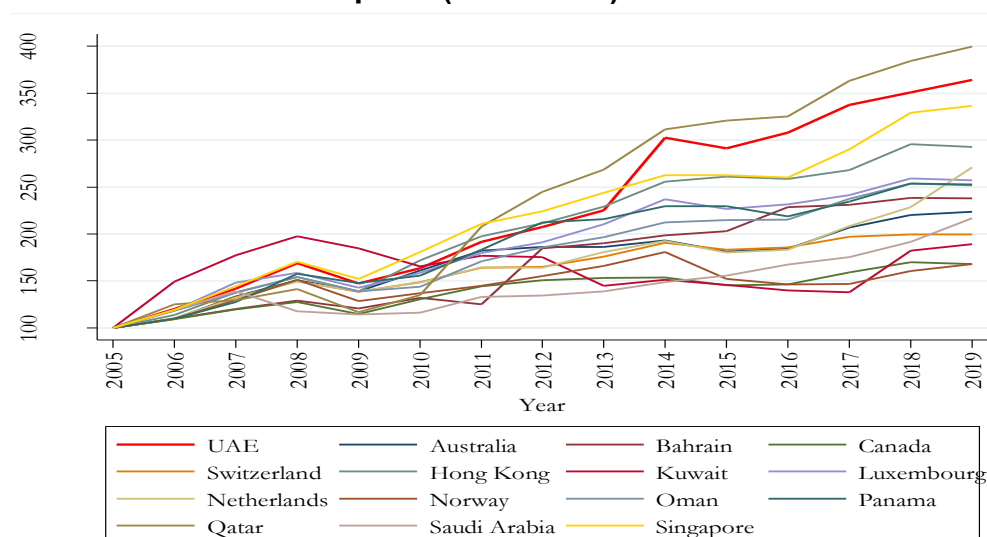
Source: Own elaboration based on the World Trade Organization

The preponderant role of services in explaining the expansion of exports is largely due to the performance of the largest categories, Travel and Transport. They have expanded at a CAGR of 7.9% and 11.4%, respectively, during 2005 and 2019. Therefore, they increased their share in total exports from 8.6% and 5.1% in 2005 to 9.9% and 9.1% in 2019, respectively. Nonetheless, some service sectors have grown even faster, allowing them to expand their share by a larger factor. In fact, as expressed in Figure 12, seven out of the 15 subsectors with the highest export growth correspond to services. For this reason, it is not surprising to find that even relatively smaller service sectors, such as other business services, ICT, and construction are also among the ones with the largest participation in total export growth. The last two cases are particularly interesting. They went from representing about 0.2% and 0.2% of UAE exports in 2005 to they came to represent 1.4% and 0.9% in 2019, respectively.

The growth of the different service sectors is not only high in relation to the one shown by the other components of the UAE export basket but also in comparison to that exhibited by the same sectors internationally, as can be seen in Figure 13.

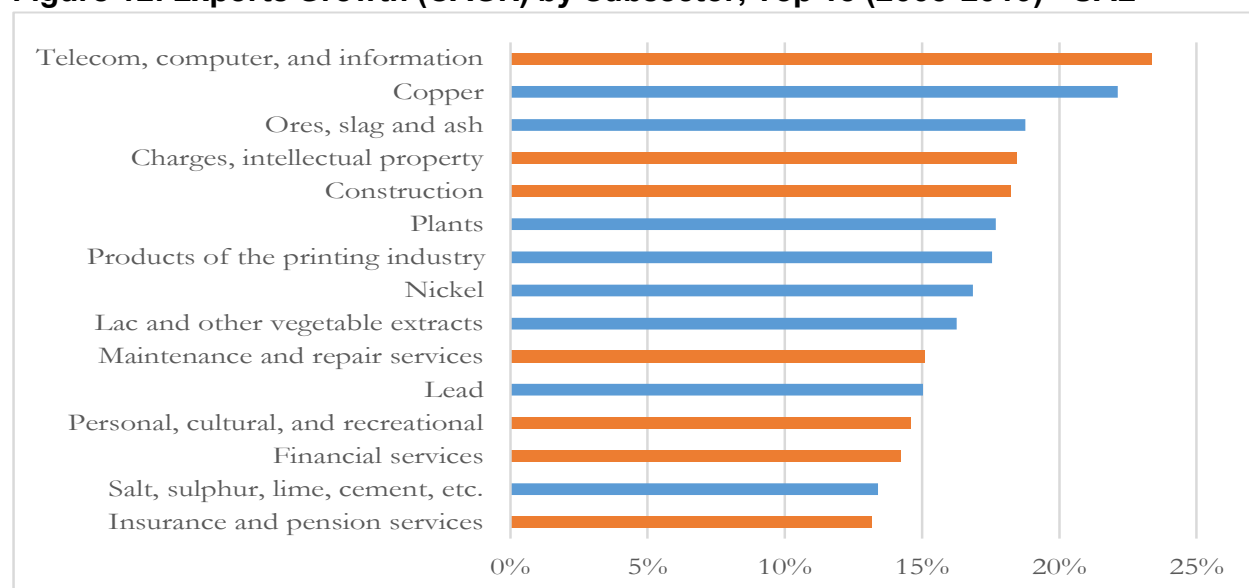
One way to quantify this is to measure how much UAE's global market share expanded in the period 2005-2019. Figure 14 details this metric for each of these sectors. UAE's participation has more than doubled in the great majority of the categories, reaching multiples greater than 4 in Intellectual Property, Construction, and ICT.

Figure 11: Value of Services Exports (2005-2019) - UAE and Benchmark Countries



Source: Own elaboration based on the World Trade Organization

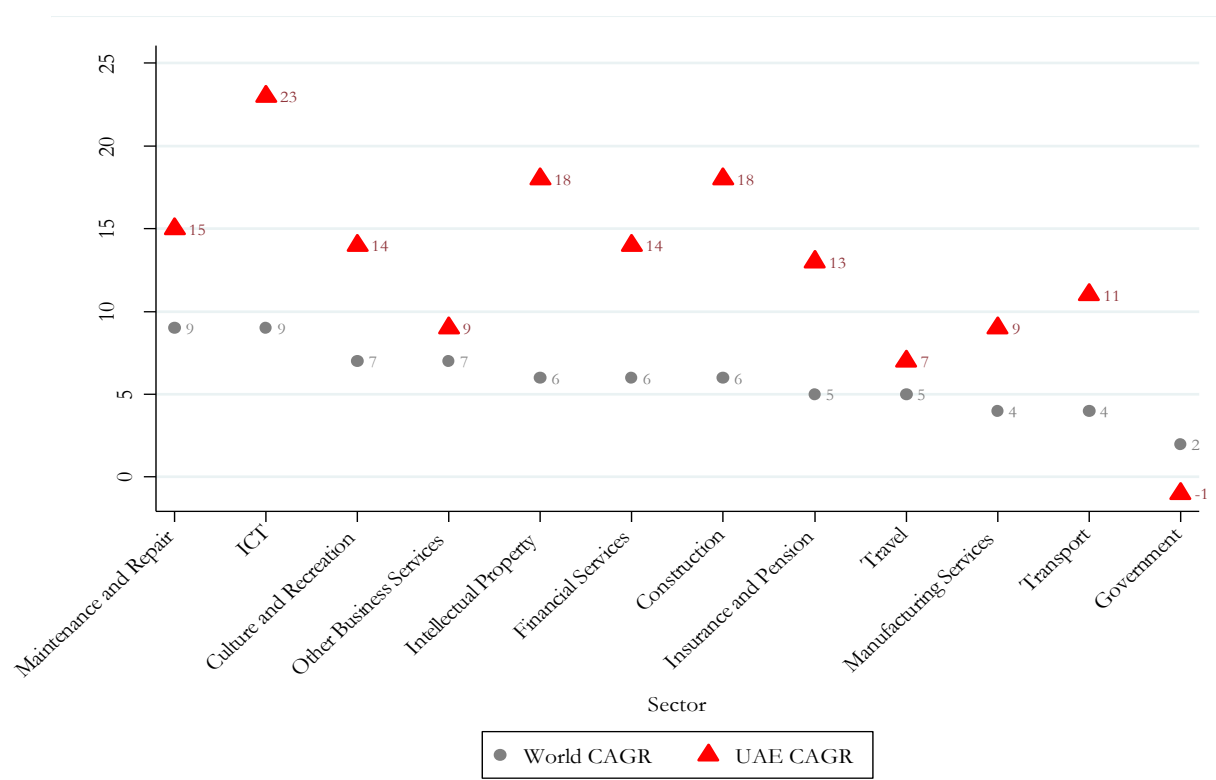
Figure 12: Exports Growth (CAGR) by Subsector, Top 15 (2005-2019) - UAE



Note: Goods in blue, services in orange

Source: Own elaboration based on COMTRADE and the World Trade Organization

Figure 13: Growth of Services Exports by Sector (2005-2019) - World and UAE



Source: Own elaboration based on the World Trade Organization

Figure 14: World Market Share (MS) Expansion by Service Sector (2005-2019) - UAE

Sector	MS Exp.*	MS_2019
Telecom, computer, and information	5.61	0.70%
Construction	4.63	2.15%
Charges, intellectual property	4.32	0.19%
Financial services	2.91	0.33%
Insurance and pension services	2.79	0.62%
Personal, cultural, and recreational	2.54	0.74%
Transport	2.53	2.31%
Maintenance and repair services	2.11	0.64%
Manuf. services on physical inputs	1.89	0.06%
Travel	1.46	1.99%
Other business services	1.37	0.93%
Government goods and services	0.63	1.27%

* MS_2019 / MS_2005

Note: Sorted by world market share expansion

Source: Own elaboration based on the World Trade Organization

UAE's world market share in services exports has grown consistently, standing out in sectors such as Transport, Construction, and Travel. As described above, the UAE was able to achieve a notable expansion of its services exports in the period between 2005

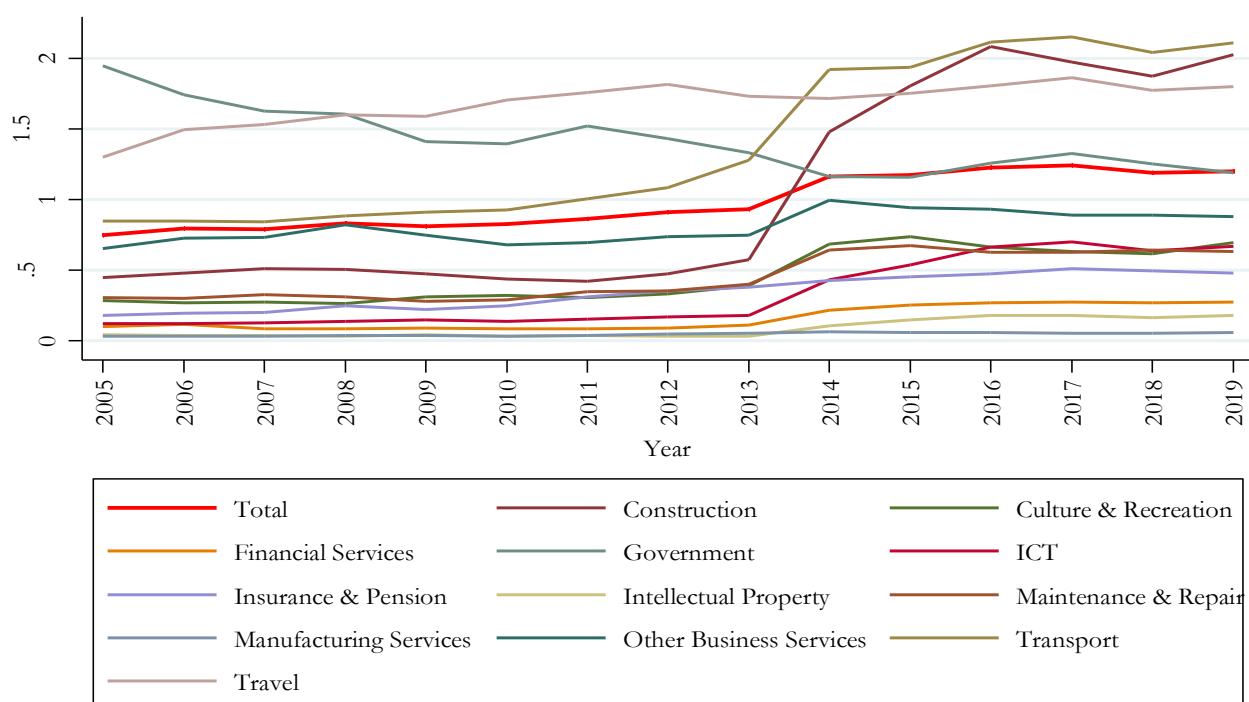
and 2019. Consequently, it is not surprising to find that its world market share increased, from 0.8% in 2005 to 1.2% in 2019. This positive performance was transversal to all sectors, except for Government (Figure 15).¹² This should come as no surprise since –as shown above– the UAE grew at a higher rate than the world in all sectors (aside from Government). In this context, the sectors in which the UAE shows the largest shares are Transport, Construction, and Travel, reaching levels around 1.8%-2.1% in all of them.¹³

Finally, the partners that explain most of the rise in services exports are China (8.8%), USA (7.5%), Great Britain (6.6%), India (6.4%), Singapore (4.9%), Japan (4.7%) and Saudi Arabia (4.7%). In terms of partner-sector combinations, most of the ones that show a large participation involve either travel or transport (Figure 17). In this sense, the China-Travel combination stands out. It is worth mentioning that other business services exports to Great Britain, Japan, and USA also rank among the top ones. It is also worth highlighting that ICT exports to USA, Great Britain, and India show relevant shares (around 0.6% of services exports growth).

¹² This sector includes embassies and consulates, military units and agencies, and other government goods and services.

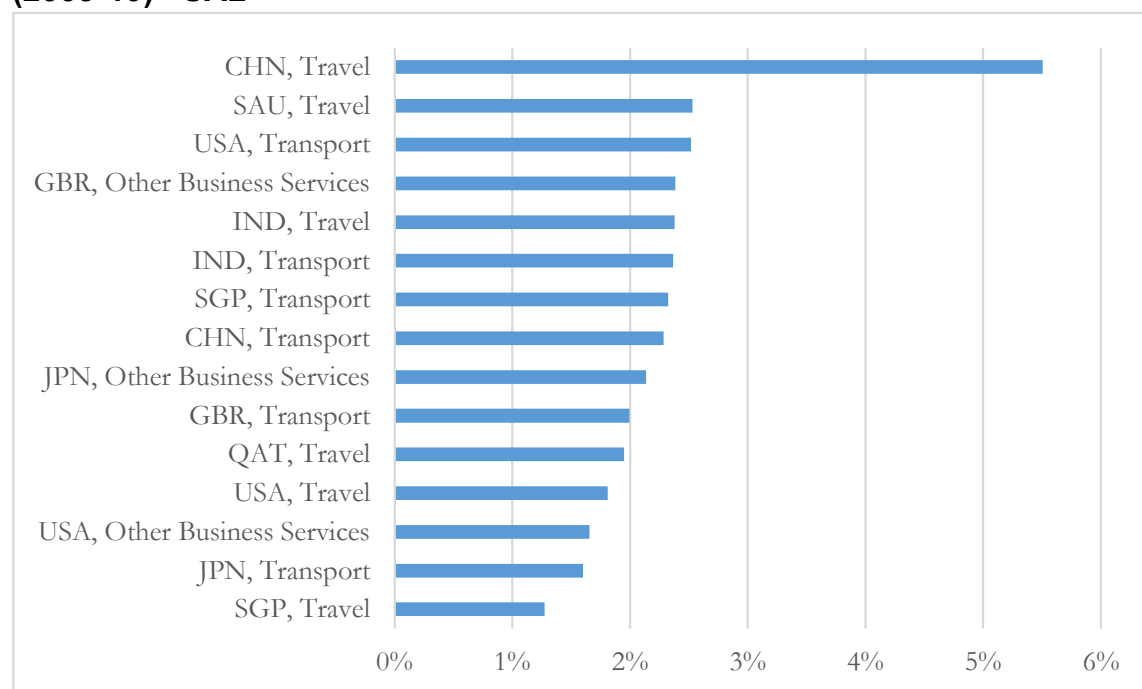
¹³ To better understand the evolution of UAE's market share and the opportunities that exist for it in services, it is useful to conduct specific analyses for relevant markets. Market-level analysis is especially important for services exports since trade tends to be more sensitive to the target market. Annex 2 focuses on analyzing UAE's market share for relevant regions and countries.

Figure 15: World Market Share by Service Sector (2005-2019) - UAE and Benchmark Countries



Source: Own elaboration based on the World Trade Organization

Figure 16: Share in Services Exports Growth by Country and Subsector, Top 15 (2005-19) - UAE



Source: Own calculations based on the World Trade Organization

4.2 Export Diversity

Export diversity is a relevant indicator for evaluating a country's diversification trajectory. As stated above, it corresponds to the number of products in which the country exports more than its "fair share" (i.e., where it exhibits a high export intensity relative to the rest of the world -- technically, an RCA equal to or above 1). This is a relatively stringent standard that implies that the country is not only able to produce and export a product but to export it more than its "fair share", strongly suggesting that it is efficient in its production.

Even though the diversity of the UAE's export basket experienced rises in certain years (2010 and 2013-17), it has remained relatively stable at around 100 throughout the period (Figure 18). Still, it has reduced the gap with that of some successful diversifiers and hubs, such as Australia and Norway. This has occurred in a context in which some of the most diversified countries in the group have been gradually losing diversity (Switzerland, Australia, Panama). As a result, the UAE now shows diversity levels that are relatively similar to some successful diversifiers and hubs, although it is not the only one; Saudi Arabia, Bahrain, and Oman have also come closer.

When a place is strongly concentrated in the exports of a product whose volume or price can be subject to shocks, as is the case of the UAE with oil (and, also to some extent to transport and travel), the above measure of diversity can be significantly affected by temporary shocks. To address this concern, we consider alternative measures that are not affected by this issue and a somewhat different picture emerges. For instance, if we measure diversity by the number of products with exports greater or equal to USD 100 million, then the UAE shows an upward trend, also reaching the levels of some successful diversifiers (Australia and Norway) but at a larger distance from regional peers.¹⁴ In this respect, it should be noted that although an absolute threshold has the advantage of not being affected by variations in other products, it is disadvantageous for smaller countries such as many regional peers (except for Saudi Arabia).

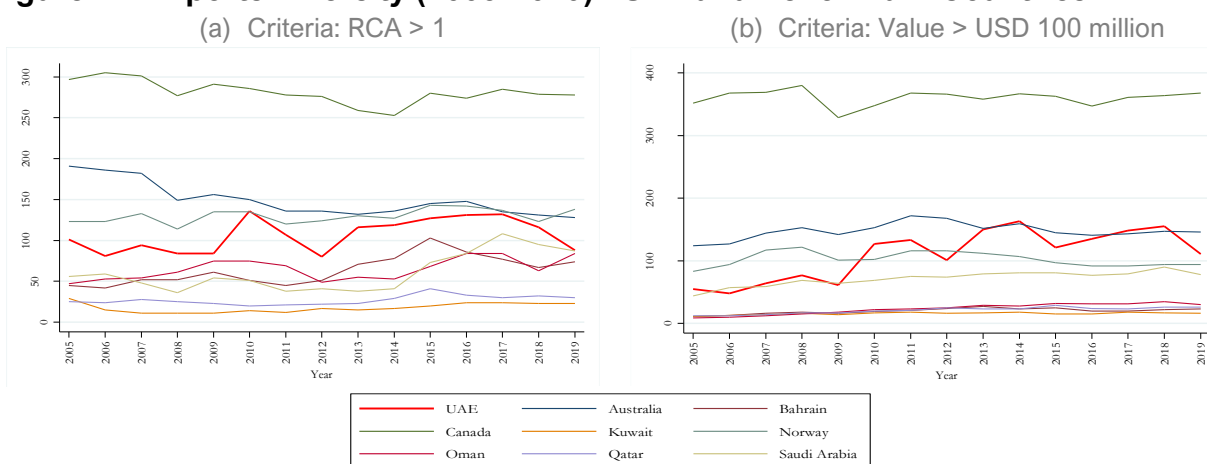
Metals, chemicals, minerals, and agriculture concentrate a large share (~75%) of the products in which the country shows a comparative advantage ($RCA \geq 1$).¹⁵ Figure 19 shows the percentage that each sector represents of UAE's diversity or comparative advantage. In the case of metals, diversity is concentrated in iron and steel (including articles), aluminum, and copper. In chemicals, organic and inorganic chemicals, as well

¹⁴ The definition of this value is somewhat arbitrary, but it is based on the fact that at the end of the period the UAE shows a diversity similar to that shown if the $RCA \geq 1$ criterion is considered.

¹⁵ The service sector appears with a low participation in the UAE's diversity. This is a consequence of services being aggregated into broad categories in the WTO dataset, thus not constituting an adequate representation of the real contribution of services to the country's diversification process.

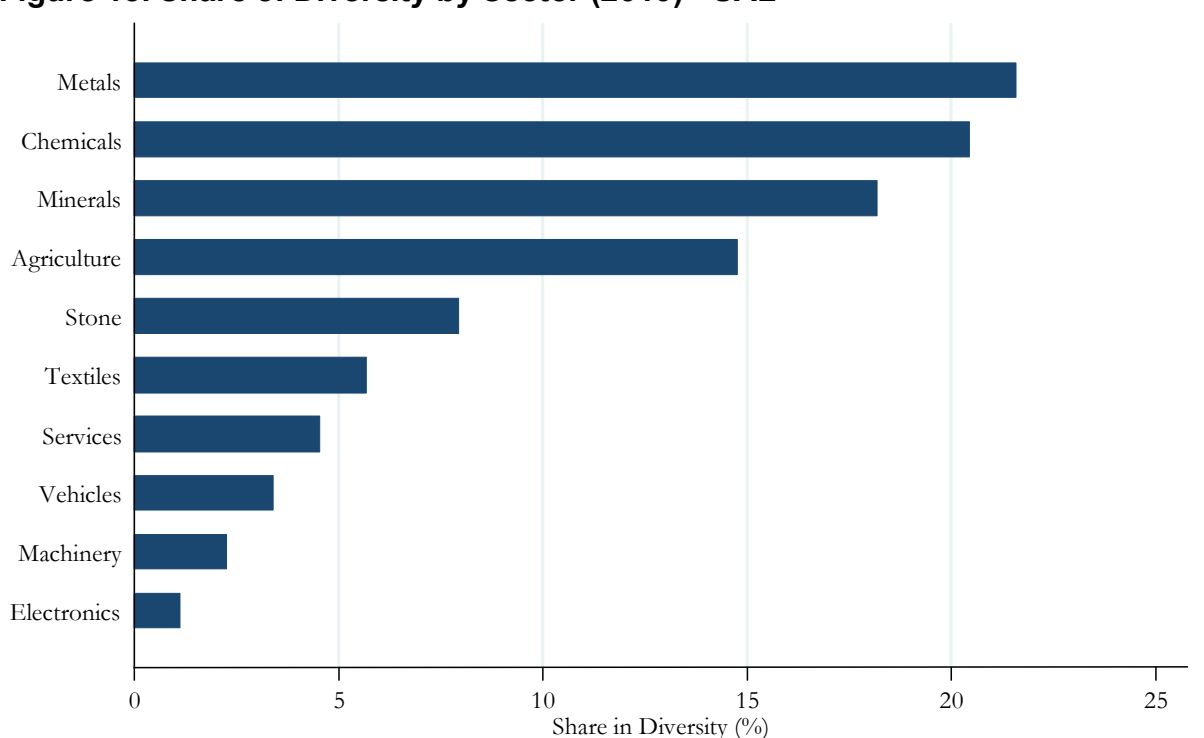
as essential oils show a high presence. As for minerals, salt, sulfur, lime, cement, mineral fuels, oils, and waxes are -by a wide margin- the subsectors driving minerals' diversity. Finally, diversity in the agriculture sector is driven by tea, food preparations, animal products and feed, and products related to paper, among others.

Figure 17: Exports Diversity (2005-2019) - UAE and Benchmark Countries



Source: Own elaboration based on COMTRADE and the World Trade Organization

Figure 18: Share of Diversity by Sector (2019) - UAE



Source: Own elaboration based on COMTRADE and the World Trade Organization

5. Understanding the UAE's productive capabilities

In this section, we deploy the economic complexity framework introduced above, using export data, to calculate economic complexity metrics for the UAE and hence infer the collective knowhow that the country possesses, as well as the contribution of different activities to the country's economic complexity.¹⁶

5.1. Economic Complexity Index in the UAE

The economic complexity of UAE exports has remained fairly stable over the period, at a relatively low level (Figure 20). In line with the evolution shown by the diversity measure, complexity decreased in 2018 and 2019, falling below the world average. Moreover, the level of complexity shown by the country in 2019 compares negatively with what is observed in its peers, even in the region (Figure 21).

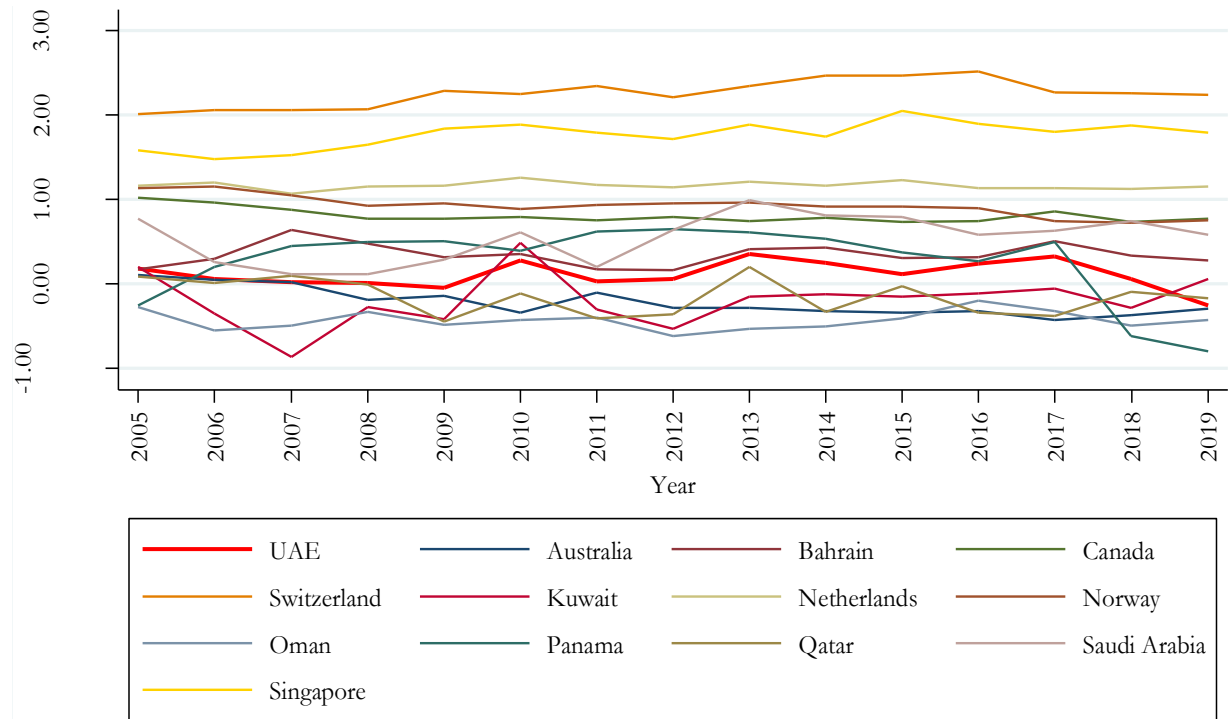
The low level of relative complexity of the UAE is explained, on the one hand, by the low relative share in diversity of “high-complexity” product families. Figure 22 shows the share that each sector represents within the diversity of the benchmark countries, highlighting the UAE's position in red. The number shown in each column corresponds to the UAE's ranking among this group of countries in each sector. The results indicate that even though chemicals account for roughly 20% of the UAE's diversity, the country's diversity in chemicals is not particularly high in comparison to benchmark economies. The same is true in other high-complexity sections such as vehicles, machinery, and electronics. On the other hand, the UAE's low level of complexity can also be explained by the low level of sophistication that the country shows within the different sections. Even for product families that are highly complex on average, the UAE tends to have a presence in lower PCI products. This is shown in Figure 23, where it is possible to observe that the UAE ranks 8th or lower in all sectors, except for electronics (moreover, it ranks 10th or below in six out of 10 sectors).

Combining both dimensions (contribution to diversity and average complexity); it is possible to assess the relative contribution of different sectors to complexity. As detailed in Figure 24, the UAE's negative complexity performance is mostly explained by the minerals, agriculture, and metals sections (since the UAE's complexity is negative, a higher share means reducing complexity the most). At a more disaggregated level, Figure 25 indicates that the individual products that add the most to the complexity are

¹⁶ The complexity metrics discussed in this section were computed on the basis of a novel dataset providing additional (although still limited) insight into the roles of services, and taking into account figures as reported by importers to better distinguish domestic exports from re-exports. As a result, these metrics differ and can be considered an improvement over the less customized measures publicly available in the Atlas of Economic Complexity.

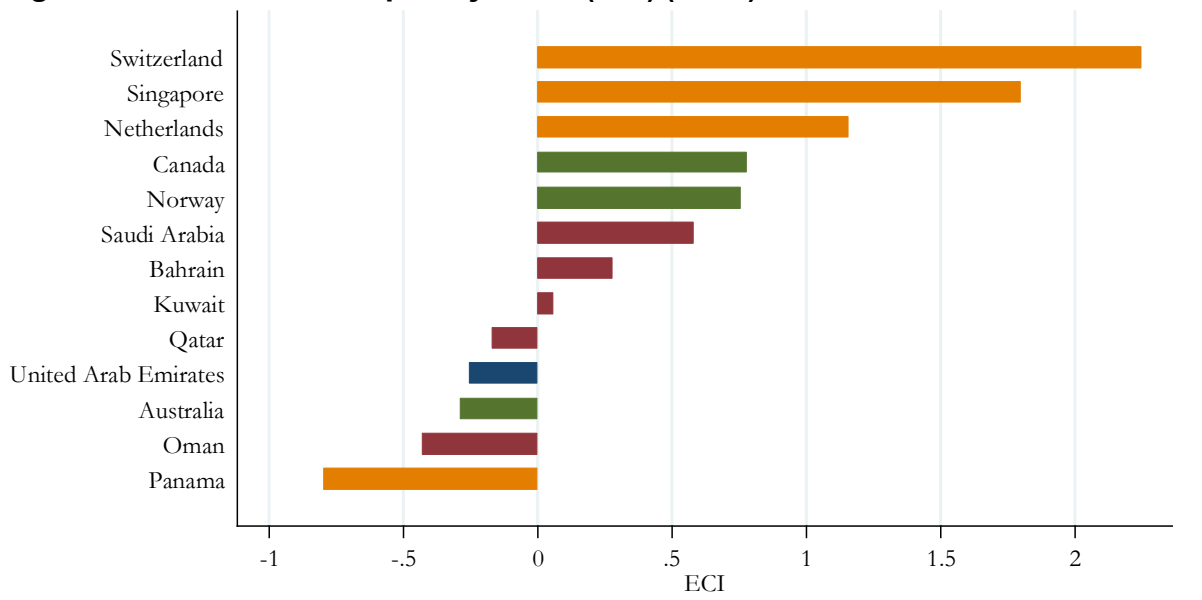
concentrated in chemicals and metals, while those that subtract the most belong to minerals (oil) and agriculture (also services).

Figure 19: Economic Complexity Index (ECI) (2005-2019) – UAE and Benchmark Countries



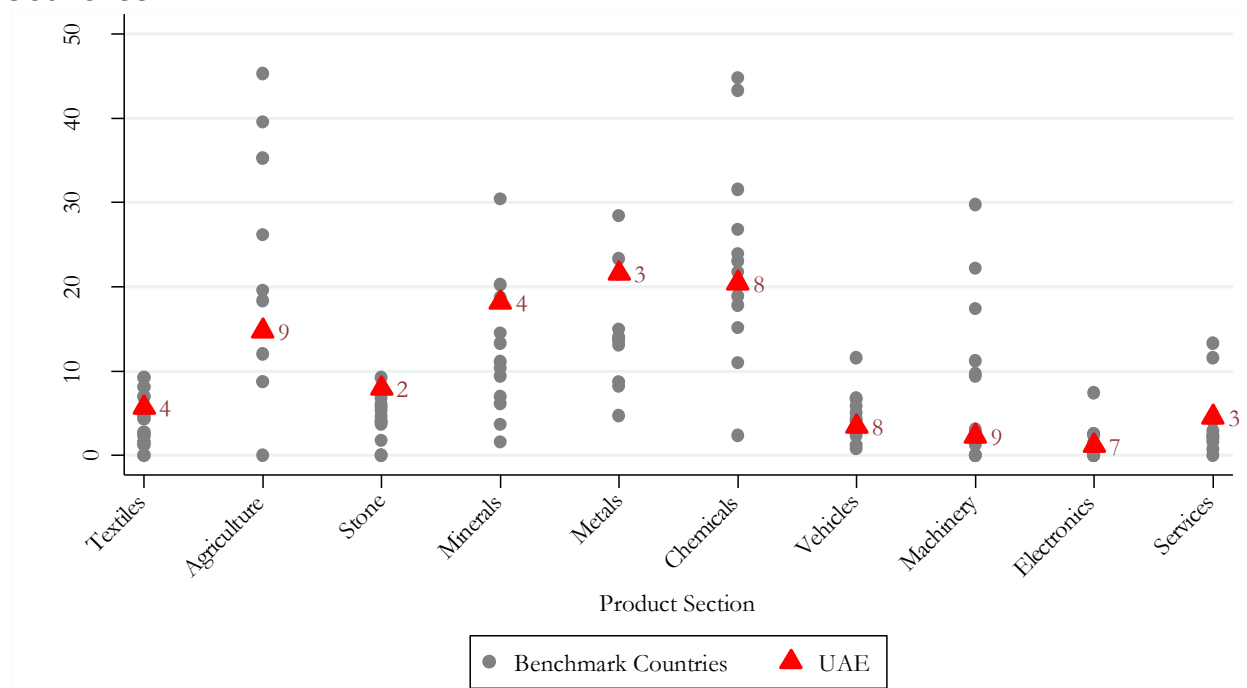
Source: Own elaboration based on COMTRADE and the World Trade Organization

Figure 20: Economic Complexity Index (ECI) (2019) – UAE and Benchmark Countries



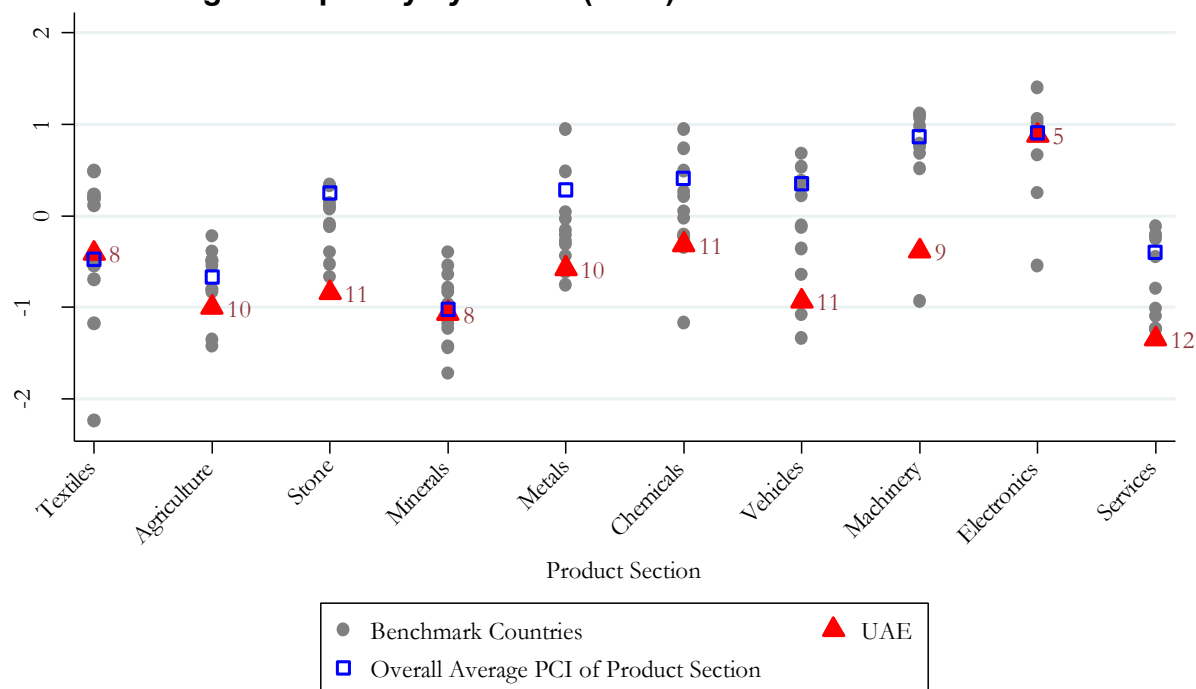
Source: Own elaboration based on COMTRADE and the World Trade Organization

Figure 21: Contribution to Diversity by Sector (2019) – UAE and Benchmark Countries



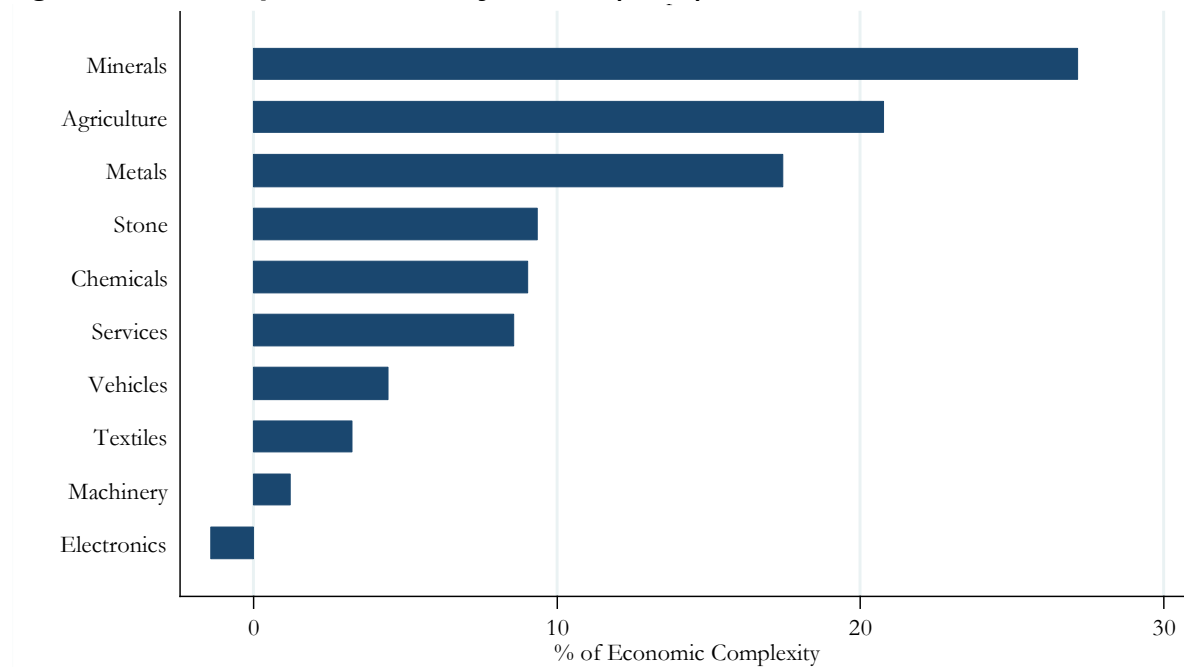
Source: Own elaboration based on COMTRADE and the World Trade Organization. Note: The number in red denotes the UAE's ranking within the benchmark group (13 countries, including the UAE)

Figure 22: Average Complexity by Sector (2019) - UAE and Benchmark Countries



Source: Own elaboration based on COMTRADE and the World Trade Organization. Note: The number in red denotes the UAE's ranking within the benchmark group (13 countries, including the UAE)

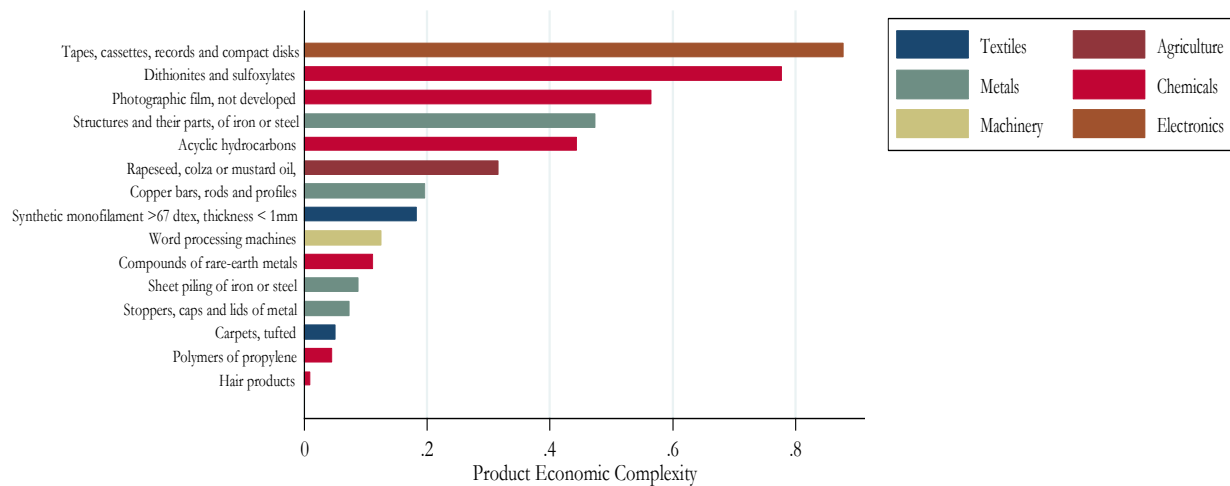
Figure 23: Participation in ECI by Sector (2019) - UAE



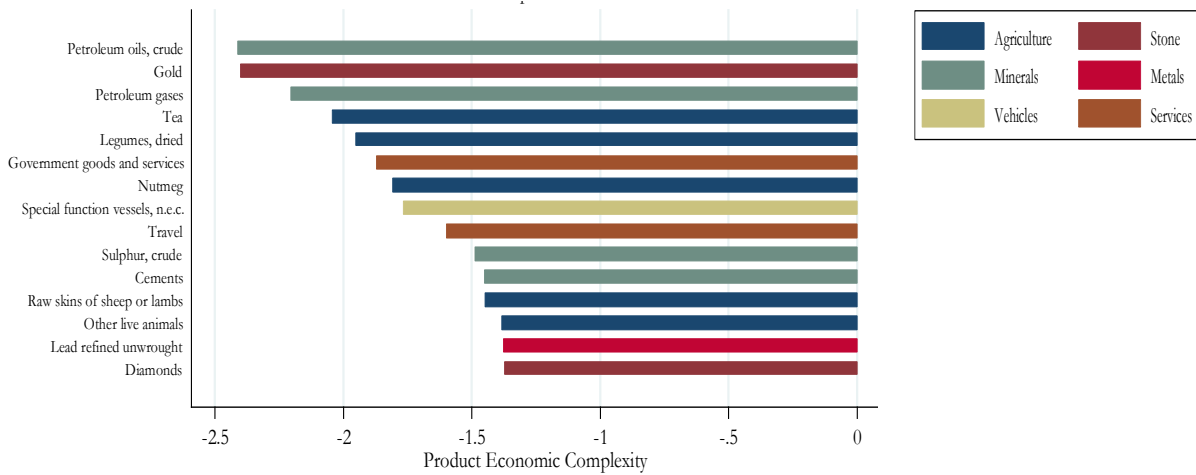
Source: Own elaboration based on COMTRADE and the World Trade Organization

Figure 24: Largest Contributors / Detractors to Complexity (2019) – UAE

a) Contributors (Top 15)



b) Detractors (Top 15)



Source: Own elaboration based on COMTRADE and the World Trade Organization

5.2 The Case of Services

For technical reasons, trends in goods overwhelmingly drive complexity results. This is because the merged trade dataset used considers nearly 1,200 HS-4 digits products and only 12 service categories, making the contribution of services to the ECI results marginal. In addition, these service categories are very broad and comprise a range of activities of varying levels of complexity, making the specific PCI that the methodology calculates for each one of them less meaningful than in the case of goods. Nonetheless, with these limitations in mind and given the relevance of services in the UAE's recent diversification trajectory, it is still worth evaluating the relative complexity of the broad categories in which the UAE is intensive.

At this highly aggregated level, the results indicate that the UAE has specialized in travel, transport, construction, and government services (in all of them, the UAE displays an $RCA \geq 1$), precisely the categories that show the lowest levels of complexity (Figure 26). This does not imply that there are no highly complex transport or travel services in which the UAE has a comparative advantage, only that on average transport or travel services tend to be less complex than, for example, financial or business services.

Figure 25: Relative Comparative Advantage by Services Category (2019) – UAE

Sector	Export Value (USD)	RCA	M	PCI
Manufacturing services on physical inputs	64,034,171	0.05	0	0.28
Maintenance and repair services	654,925,467	0.55	0	1.32

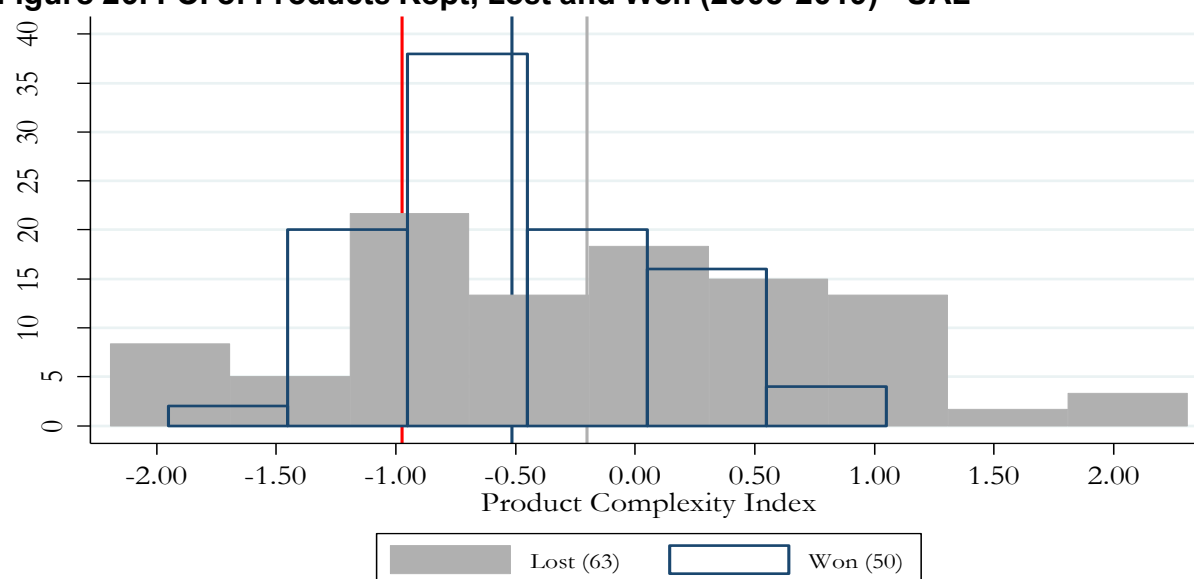
Sector	Export Value (USD)	RCA	M	PCI
Transport	23,454,405,838	1.99	1	-1.30
Travel	25,326,708,561	1.71	1	-1.80
Construction	2,191,048,435	1.85	1	-0.06
Insurance and pension services	843,461,839	0.54	0	0.48
Financial services	1,132,417,561	0.28	0	1.95
Charges, intellectual property	805,251,821	0.17	0	3.84
Telecom, computer, and information	3,488,080,095	0.60	0	0.28
Other business services	12,336,793,587	0.80	0	0.86
Personal, cultural, and recreational	594,457,475	0.63	0	-0.06
Government goods and services	1,114,767,281	1.10	1	-2.28

Source: Own elaboration based on COMTRADE and the World Trade Organization. Notes: RCA = Revealed Comparative Advantage; M = Market presence indicator; PCI = Product Complexity Index. Highlighted rows indicate sectors with M = 1 (comparative advantage). Export values in USD.

An alternative way to gain a better understanding of the evolution of complexity in the UAE is to compare the complexity of the products that the UAE “lost” and “gained” during the period. To make things simple, we consider “lost” products the ones in which the UAE had an $RCA \geq 1$ in 2005 and an $RCA < 1$ in 2019, while we think of “gained” products as those for which the opposite is true (products “kept” are those for which RCA is equal or larger than 1 in both 2005 and 2019). Following that definition, in the period 2005-2019, the UAE lost 63 products and won 50. The UAE has kept low complexity products and lost a large number of products with a relative higher product complexity. Unfortunately, the complexity of the products “gained” does not fully compensate for that loss (Figure 27).

The UAE not only displays relatively low complexity but also faces challenges to increase its complexity because it has a low complexity outlook index (COI). The country’s productive capabilities do not position the country in an area better “connected” to more complex activities. Consequently, the country performs poorly in the COI metric, ranking below successful diversifiers, hubs and even some regional peers (Figure 28).

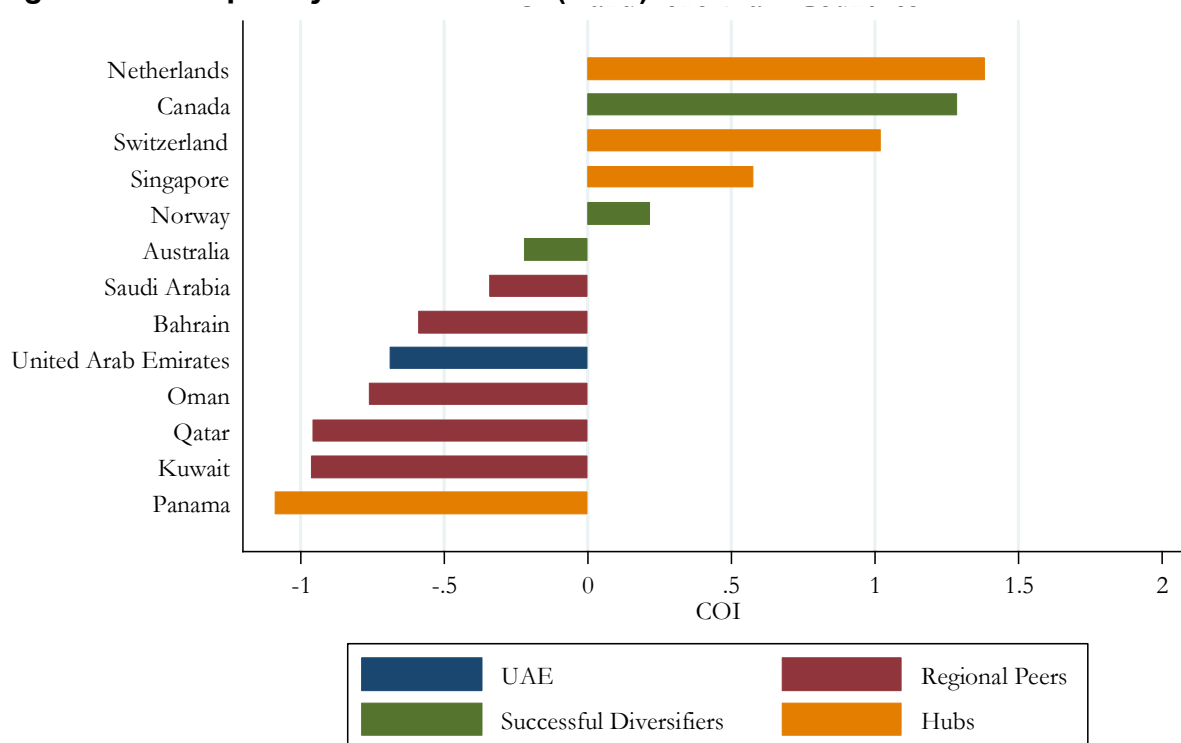
Figure 26: PCI of Products Kept, Lost and Won (2005-2019) - UAE



Note: Red, gray and blue lines represent the average PCI in 2019 of products kept (38), lost (63) and won (50), respectively

Source: Own elaboration based on COMTRADE and the World Trade Organization

Figure 27: Complexity Outlook Index (2019) - UAE and Benchmark Countries



Source: Own elaboration based on COMTRADE and the World Trade Organization

6. Identification of Diversification Opportunities

This section describes a straightforward complexity-based methodology to identify goods and activities that may have the potential to positively contribute to high-productivity diversification in the UAE. We then present the resulting preliminarily identified themes.

The objective of this exercise is to leverage economic complexity and product space concepts to uncover information contained in trade and employment data and hence identify potential diversification opportunities for the UAE. This exercise is meant to serve as an initial contribution to outlining a diversification agenda by leveraging a complexity-driven approach to identify key opportunities for export growth on both the intensive and extensive margins.¹⁷ However, it should not be interpreted as a final list of products or activities to be pursued. Ultimately, policymakers should use an iterative and dynamic process – involving a variety of stakeholders (policymakers, academia, industry experts, civil society, etc.) – to validate the results of the methodology, consider complementary measures of attractiveness and feasibility, and prioritize efforts. Furthermore, the current analysis is largely anchored around economic complexity, which is one of several possible approaches to approximate diversification paths. Accordingly, there may be high potential opportunities that were not captured by this exercise. Conversely, there may well be economic or policy reasons to exclude or de-prioritize some of the themes identified in this report.

6.1 Sector Identification Process

To develop a rich and comprehensive understanding of productive capabilities and diversification opportunities in the country in the face of strong data constraints, we use two separate approaches. In the case of goods, we rely on country-level export data to implement a more traditional economic complexity approach. However, the process required making important adjustments to the data in order to address issues with the reporting of re-exports and oil exports. Based on complexity indicators calculated using the adjusted dataset, we select a relatively broad list of products which are then prioritized based on additional feasibility and attractiveness considerations, including recent export growth. In simple terms, we select a somewhat large set of products based on complexity metrics that we then narrow down based on demand considerations. This process is summarized in Figure 29.

¹⁷ The extensive margin here refers to products or activities in which the UAE is not yet intensive, i.e. where there is no or low activity in the country relative to global or international benchmarks. The intensive margin refers to products or activities that are already present in the UAE, where even further specialization may prove beneficial.

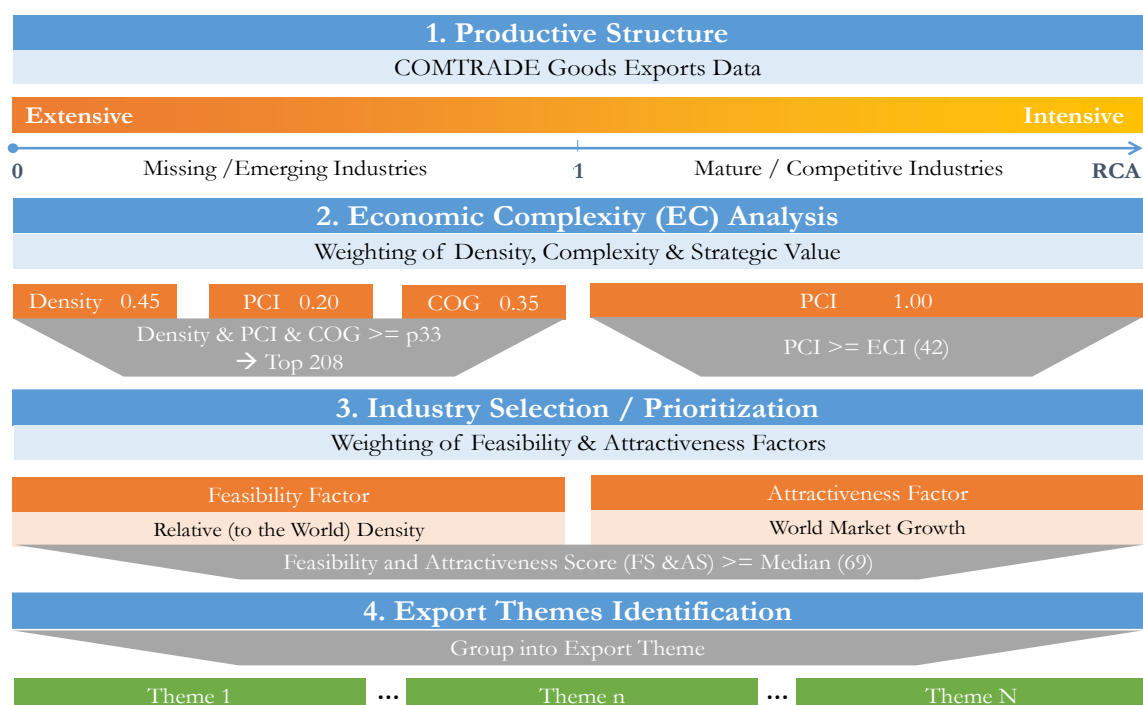
Regarding services, and as explained in previous sections, we do not use export data because of a lack of data availability. As a consequence, we rely on employment data. We first approximate employment figures at an industry level for the UAE, and, using the USA as a benchmark, we estimate the country's current productive capabilities. We then use information on USA services export composition and its evolution to identify the most internationally tradable services and select the activities experiencing high export growth. Finally, we prioritize activities based on adjacency to current UAE production and level of wages, as indicators of feasibility and attractiveness. In that sense, the approach for services also relies both on complexity and demand analyses, but the order is reversed: we first identify high-growth tradable services and then prioritize services using proxies for complexity/sophistication and adjacency. This reversed order reflects the lesser reliability of complexity metrics when using employment data, leading us to make demand trends more prominent in the analysis. This process is summarized in Figure 33.

What both approaches have in common is an exclusive focus on tradable sectors. Given the relatively small size of the local economy and its exposure to sector-specific external shocks, it is appealing to focus diversification efforts on tradable industries with export growth potential. All things equal, industries that can serve external markets have more potential to grow independently of what happens in the UAE's oil industry. Because it is based on export data, the approach for goods automatically focuses on tradable products. For the employment-based approach to services, we deliberately filter out non-tradable industries.¹⁸

Within the tradable pool of products or industries, it is possible to consider export growth along two dimensions: on the intensive margin, where existing industries can be scaled up; and on the extensive margin, where new or nascent industries can be successfully developed leveraging the country's current productive capabilities. Industries to be identified on the intensive margin are taken from the pool of industries where the RCA is greater than one, while products to be identified on the extensive margin are taken from the pool of products with an RCA of less than one.

¹⁸ Rigorously defining what industries are tradable or non-tradable is non-trivial. In this report, we rely on a manual process combining three separate indicators of tradability that were elaborated by the Growth Lab for different purposes and on the basis of different datasets.

Figure 28: Sector Identification Process for Goods



Source: Own elaboration.

6.1.1 Sector Identification Process for Goods

Diversification opportunities on the side of goods are identified based on economic complexity metrics – distance, PCI, and COG – in different ways for both the intensive and extensive margins. As explained in Box 1:

- Distance indicates how “nearby” a product is to products where the UAE already exhibits $RCA > 1$. It serves as a proxy for how feasible it would be for the UAE to specialize in the product.
- PCI measures how complex a certain product is, and it serves as a proxy of whether the industry would help improve the country’s overall economic complexity.
- COG quantifies how much developing a new product would enable access to additional new products of higher complexity, and serves as a proxy of whether the industry would help improve the country’s overall strategic positioning.

While PCI and COG may be positively correlated, for most countries there tends to be a negative correlation between density and PCI/COG, reflecting an important trade-off.¹⁹ The most complex products and those with the best strategic positioning tend to be further away from existing capabilities, while less complex products tend to be closer.

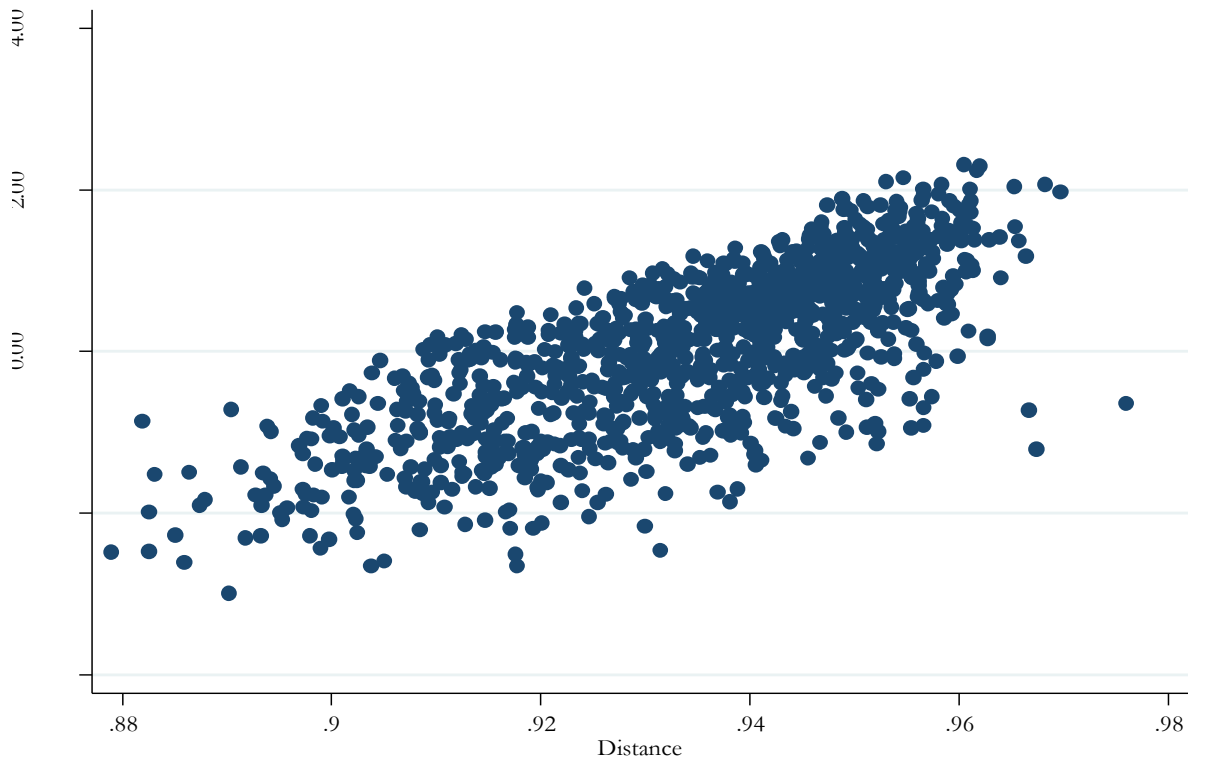
¹⁹ For a few high complexity countries, the correlation between density and PCI can be positive as they can be strategically positioned near high-complexity products.

This negative relationship can be thought of as a risk-return curve. That is, the country may have less chance of success when trying to promote the development of more sophisticated industries because it requires capabilities that are further away from its initial stock. However, if the country's efforts are successful, rewards are greater because it will have gained greater complexity and/or improved its long-term strategic positioning. This trade-off can be visualized in Figure 30, which plots PCI and distance for all products in the UAE's extensive margin.

In view of this trade-off, the process of identifying strategic diversification opportunities aims to balance these three dimensions.

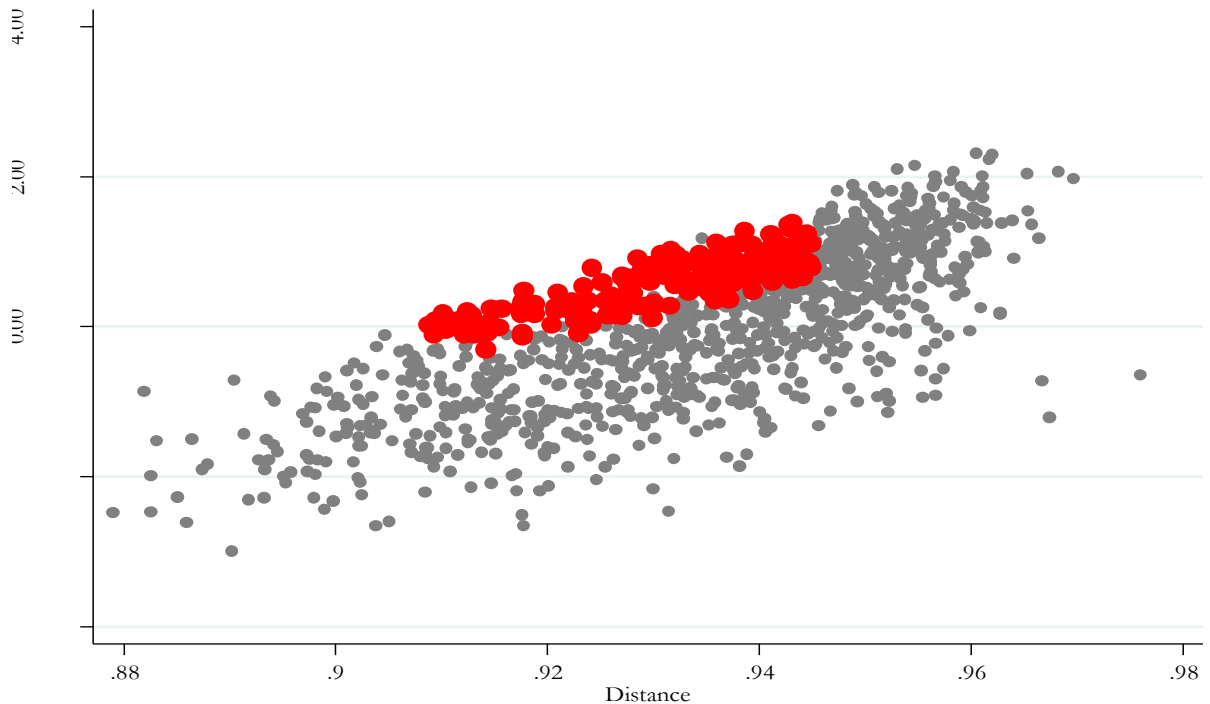
On the extensive margin, positive weights are given to all three complexity variables. A weight of 0.45 is applied on distance, while the remaining 0.55 weight is applied on PCI (0.20) and COG (0.35). This selection of weights gives greater combined relevance to PCI and COG because of the country's relatively low ECI and COI. However, to ensure that the identified products show a minimum level of viability and attractiveness from a complexity standpoint, a requirement of being in the top 2/3 of the product distribution for each of these variables is established -- however, it is mostly relevant for distance. – Figure 31 shows how the products identified under this method in the PCI and distance “space”. One might be inclined to think that for oil-rich countries – like the UAE - that tend to be “far” from most of the product space and, at the same time, have resources to at least attempt “long jumps” in that space, density is not relevant. However, we consider it as part of the process since the results of our analyses, which are summarized in Box 2, indicate that density is still informative of the diversification path followed by these types of countries (and therefore relevant to consider).

Figure 29: Extensive Margin Products: PCI and Distance (2019) - UAE



Source: Own elaboration based on COMTRADE and the World Trade Organization

Figure 30: Top Extensive Margin Products Based on Strategic Bets Approach (2019) - UAE



Source: Own elaboration based on COMTRADE and the World Trade Organization

Box 2 : Relevance of Density in Oil Rich Countries

Density in the product space is predictive of new products and of keeping existing ones. Figure 32 shows estimates of the addition of new products (columns 1 and 2) and products lost (columns 3 and 4). The sample used in the estimates includes 134 countries from 2005 to 2020. We define a new product as cases in which RCA was lower than 25% in the baseline year and has increased to more than one, while lost products are defined as those with RCA larger than one, that changes to less than 25% after five years. All estimates control for country-year and product-fixed effects. The estimate of column 1 suggests that one standard deviation higher density is associated with a 0.8% higher likelihood of adding a given product. The size of the effect is large if we compare it to the unconditional probability of adding a new product, which in our sample is 1.7%. In column 3 we test whether our sample density in the product space is predictive of keeping products present in a country. One standard deviation in density is associated with decreasing the probability of losing a product by 7.3%.

One question is whether oil-rich countries follow the prescription of the product space when adding or losing economic sectors. Oil-rich countries tend to be on the low end of the distribution of diversity of sectors, decreasing the importance of anchor industries to develop relevant agglomeration of productive capabilities and density in the product space. In addition, some oil-rich countries have been aggressive in subsidizing when attracting new industries, which can be seen as a way of coping with the lack of density in the product space. One interpretation is that oil-rich countries could add industries more randomly, departing from the path dependencies suggested by the product space. To test for this possibility, we estimate the same specifications of columns 1 and 2 adding an interaction between density and a dummy that identifies oil-rich countries. The estimates of columns 3 and 4 are small and statistically not different from zero, which suggests that oil-rich countries are not associated with an empirically different pattern than the rest of the countries. Our interpretation of this finding is that the path dependencies in the product space are relevant for oil-rich countries.

Figure 31: Density Prediction Regressions Results

VARIABLES	New products		Lost products	
	(1)	(2)	(3)	(4)
Product Density	0.008*** (0.001)	0.008*** (0.001)	-0.073*** (0.003)	-0.072*** (0.003)
Density x Oil rich countries		0.001 (0.001)		-0.007 (0.006)
Revealed Comparative Advantage (RCA)	0.171*** (0.011)	0.171*** (0.011)	-0.000*** (0.000)	-0.000*** (0.000)
Observations	347,648	347,648	94,358	94,358
R-squared	0.031	0.031	0.209	0.209
Sample	All	All	All	All
Country x Year FE	yes	yes	yes	yes
Product FE	yes	yes	yes	yes
Robust standard errors in parentheses. All specifications control for country-year and product fixed effects.				
*** p<0.01, ** p<0.05, * p<0.1				

On the intensive margin, only the PCI variable is considered. From a practical standpoint, distance and COG are not relevant for products where the UAE already has an intensive presence. Conceptually, there is no need to gauge how easy it would be for the UAE to diversify into a product if it already exports that product in an intensive manner. In this case, the selection rule adopted is that the product presents a PCI greater than or equal to the UAE's ECI, thus restricting the identification process to those products that are currently increasing the complexity of the country.

As a result of this complexity-based filtering, the process selects 250 products from both the intensive and extensive margins (42 from the intensive margin and 208 from the extensive margin). This is a large number if we consider that it corresponds to nearly 20% of the universe of existing products and is much larger than the country's current product diversity (84). The process was designed in such a way as to leave space to prioritize based on additional feasibility and attractiveness criteria.

Regarding feasibility, as the country is comparatively "far" from the most complex and strategic products, distance to its current productive capacities is a concern to address. In response, in this second stage of the process, we prioritize products once again based on distance, but this time not comparing distance with that of other products in the UAE (as done in the first stage), but with that displayed by other countries for the same product. The logic is to prioritize those products in which the UAE ranks best internationally, thereby signaling a higher potential level of competitiveness vis-à-vis other countries.

Technically, the factor corresponds to the percentile in which the UAE is located in the distribution of all countries that are not intensive in the production of goods.

As for attractiveness, we wanted to highlight world demand trends. Therefore, we selected as the attractiveness factor the growth experienced by world exports in recent years (period 2014-2019, excluding the pandemic from the analysis).

The implemented prioritization method requires that, for a product to be selected as part of this identification process, it must be above the median of the products selected based on the complexity in the attractiveness factor, in case it comes from the intensive margin, and above the median of those products both in the attractiveness and feasibility factors, in case of coming from the extensive margin.

As a result, 69 out of our 250 products were prioritized but 6 were not included based on sense-check considerations, bringing the total number to 63. At this point, we cluster these strategic products into themes to optimize eventual policy design and efforts to favor productive diversification. The resulting themes and subthemes are described in detail later in this section.

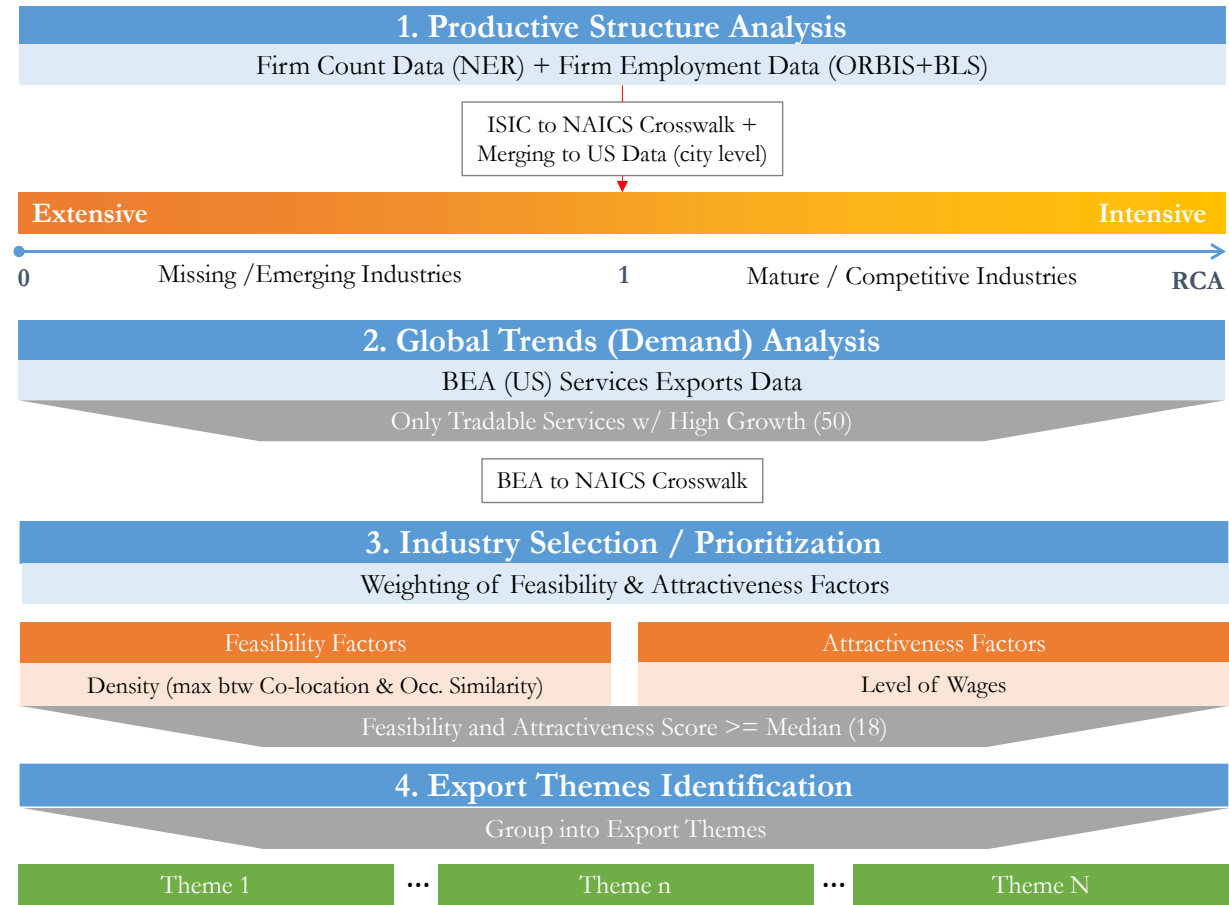
6.1.2 Sector Identification Process for Services

In the case of services, the sector identification process is based on employment data. Because employment figures at a disaggregated industry level for the UAE were not available to the project team, an approximation was necessary. A detailed view of the current employment structure is indeed necessary to estimate the country's current productive capacities and, based on this, to identify diversification opportunities that could leverage its existing know-how. A multifaceted process was implemented. First, we collected from the Ministry of Economy the different datasets that comprise the NER. Then through a natural language processing approach, we associated an industry code to each of the companies on the registry based on their business description. Next, for companies that are referenced in the international database ORBIS, we used ORBIS to obtain their employment count. When firm employment was not available in ORBIS, we imputed it based on the average firm employment for the corresponding industry and size-section in the USA, with a scaling factor to ensure aggregate employment figures match publicly available information in the UAE. The details and underlying assumptions of this process are summarized in Annex 1. On the other hand, Box 3 below describes the UAE's industry productive structure based on these employment figures.

However, having the estimate of the absolute number of employees by industry in the UAE is not enough to assess in which activity the UAE is relatively intensive as some industries are small or large in all countries. To this end, we need a benchmark against which to compute the relative intensity of an industry. As stated earlier, for this report we

chose the United States as the reference, as it has the best quality of information, is a highly diversified developed economy, and can generally be thought of as the technological frontier. By comparing UAE’s employment to that of large USA cities, we can identify activities in which the country is relatively more intensive (shows an RCA larger than or equal to one), which allows us to assume that it possesses the required knowhow for its production.

Figure 32: Sector Identification Process for Services

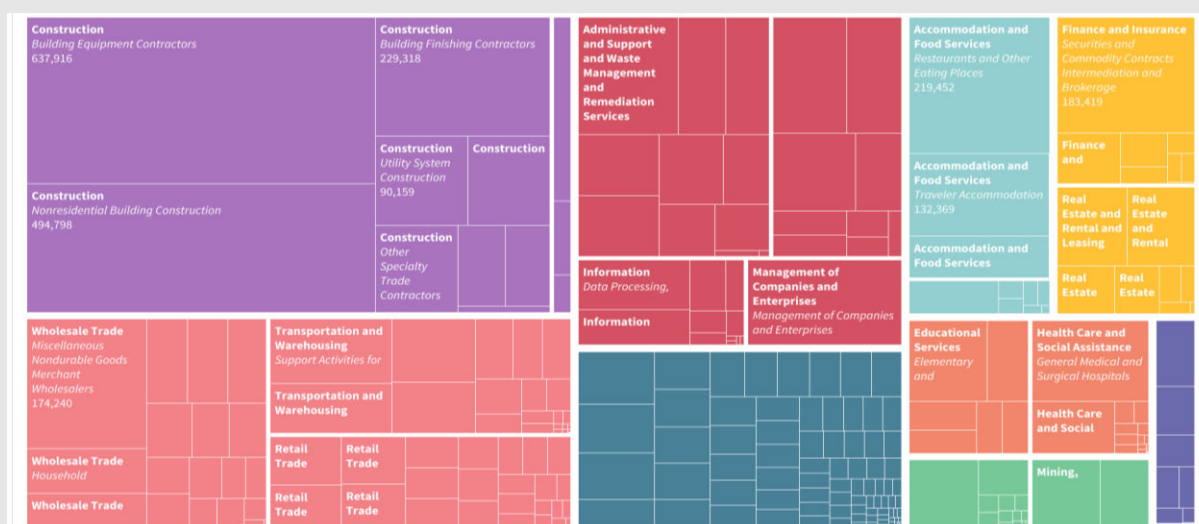


Source: Own elaboration.

Box 3: UAE Productive Structure Based on Employment Data

In absolute terms, employment in the UAE is heavily concentrated in Construction and Wholesale Trade. When using the NER to analyze the industrial structure of the Emirates, it is noticeable that most of the employment is concentrated in these sectors. Within Construction, employment is mostly concentrated in contractors that install equipment such as elevators or electricity equipment and in firms that construct non-residential buildings. In Wholesale Trade, firms are mostly classified as Miscellaneous Nondurable Goods Wholesalers, which tend to be firms that specialize in re-exporting goods from the UAE to other destinations (Figure 34).

Figure 33: Total Number of Employees per Industry (2022) - UAE



Source: Own elaboration based on National Economic Registry.

In the last few years, firm creation in the Construction sector has been strong. The main activities contributing to the accelerated growth of this category are the subsectors of Commercial and Institutional Building Construction (236220), Other Building Finishing Contractors (238390), Building Equipment Contractors (238290), and Flooring Contractors (238320). All of these codes experienced double-digit growth between 2021 and 2022, which could be attributed to a larger trend within the Construction industry within the UAE.

Wholesale trade growth has been heavily concentrated in the registration of re-exporters within the NAICS code 424990. Generally, the NER does not offer additional information about the other activities that these firms might be involved in. While these establishments are concentrated within the mainland registries in Abu Dhabi and Dubai, for other Emirates these establishments are mostly in their freezones and generally represent around 2% of their total employment.

Real Estate, Hotels, and Personal Care stores have also experienced significant growth in the last 5 years. When filtering for industries that had at least 500 firms in 2021, these three industries appear as the ones with the biggest percentage growth since 2017, where the number of firms grew 628% on average between 2017 and 2022. Annex 2 provides more details about the industrial composition of employment data for Dubai and Abu Dhabi.

Just as in the case of goods, for which we first filtered based on complexity metrics to select a relatively broad list of products, for services we also do the same, but in this case based on demand. The purpose is double: filtering out goods as well as non-tradable services, and at the same time focusing the identification process on services that are experiencing high levels of export growth.

We use USA services trade trends from the Bureau of Economic Analysis (BEA) as a proxy for understanding global demand. This is because the USA publishes more disaggregated services trade data than multilateral sources, allowing us to take a more granular view of demand trends. The US is a relevant proxy for global trade. As shown in Figure 35, the USA holds the largest market share of global imports and exports of services, representing approximately 14% of global services trade (Panel a). This is also visible across sectors, as the USA also holds the largest market share of services trade for nearly all service categories (Panel b). At the same time, as described in Figure 36, at a higher level of aggregation, the USA services trade trends generally parallel those at a global level, which is suggestive that trends at a more disaggregated trend may also be reasonably good proxies of global trends, for which there is no source available. Box 4 below describes the US service trade trends in more detail.

Matching disaggregated industries to service categories as reported by the USA was a manual process. We first associate each of the industry codes (4-digit NAICS) to the most disaggregated BEA category possible (see Annex 4 for details) and then, considering only the tradable services industries, we select for the subsequent prioritization stage industries that belong to a BEA category exhibiting a trade growth greater than the median of BEA categories.

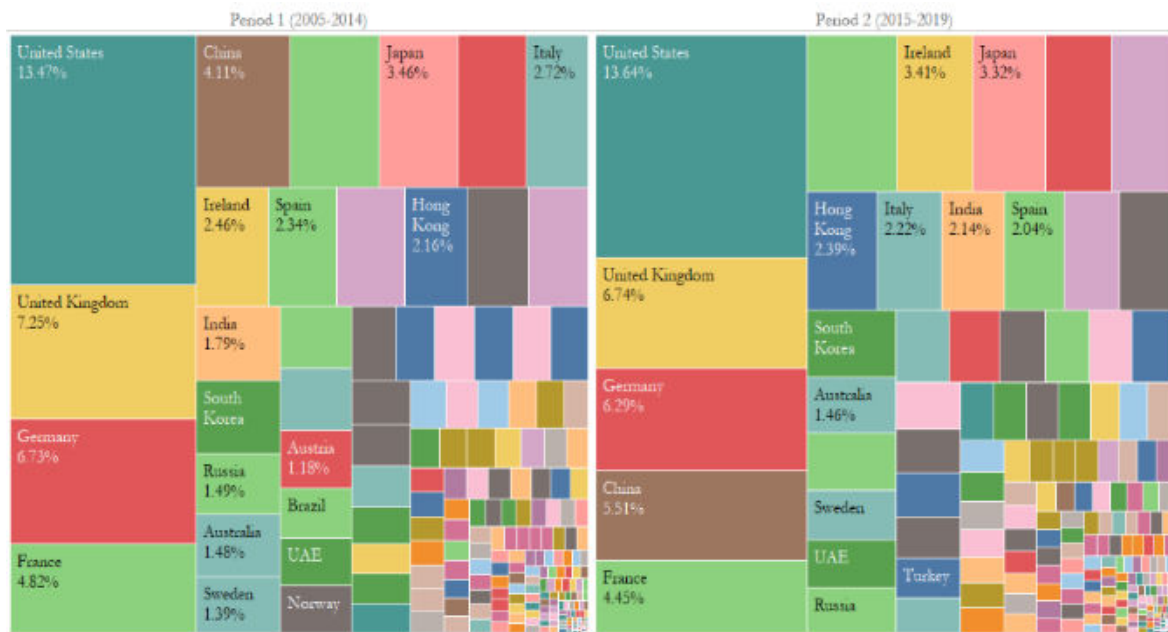
As a result of this filtering, we end up with 50 NAICS 4-digit industries. It is worth noting that most of the transport and travel-related industries, the two largest tradable service sectors in terms of exports, are filtered out in this step.

Once we have identified a relatively broad list of tradable service industries that are experiencing high demand growth, we then proceed to prioritize them based on feasibility and attractiveness indicators associated with a complexity analysis.

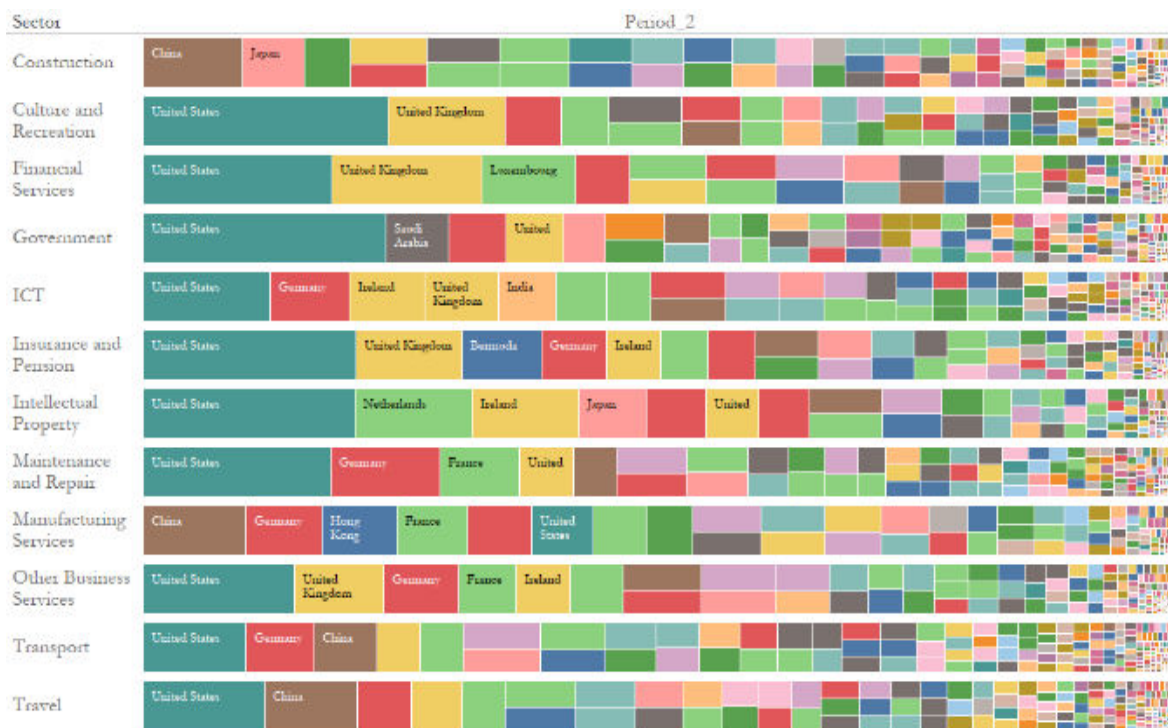
To evaluate the feasibility, we rely on the concept of density. Since for services we are working with employment data at an industry level, the precise measure of density to use is not as clear as in the case of goods (for which we have traditionally considered co-location at a country level based on export data). For this reason, we calculate two alternative measures and for each industry, we take the highest value between the two, since there might be different reasons for which the country could be “close(r)” to that industry. To calculate both of these densities we rely once again on USA data. The first of these measures corresponds to co-location at a city level, that is, two industries are considered close if we often see that both are intensely developed in the same city. The second measure corresponds to occupation similarity, under the logic that two industries are close if they employ similar occupations.

Figure 34: World Services Trade by Country (2005-2019)

a) Services Trade, by Country



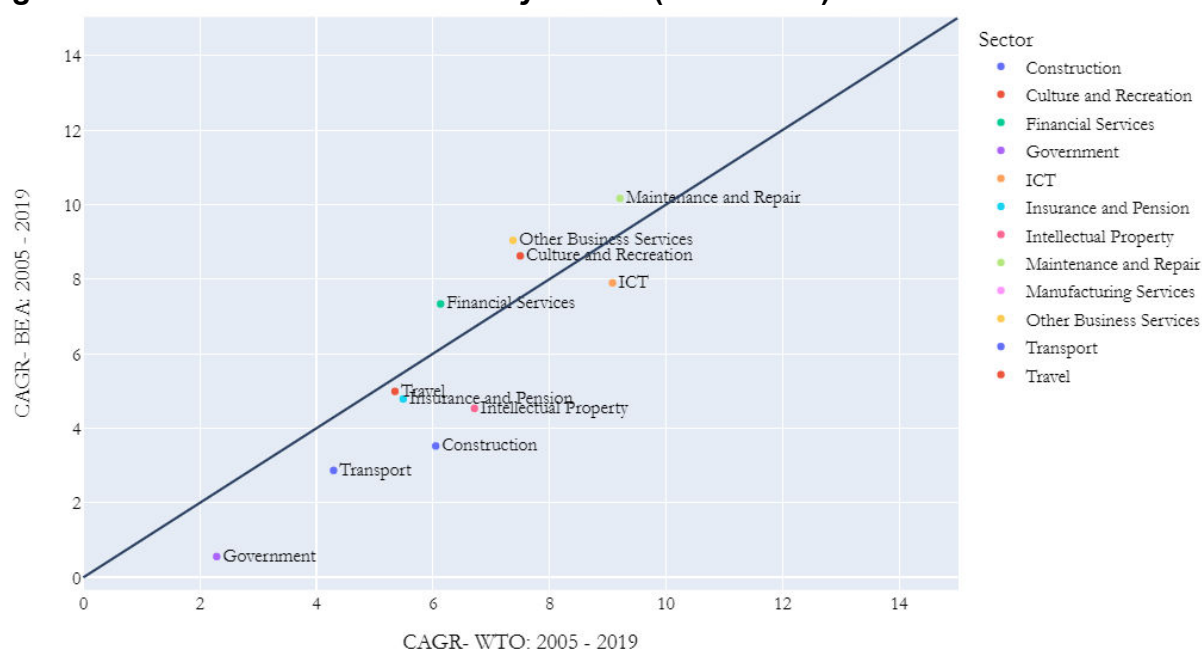
b) Services Trade, by Country & Category



Note: Services Trade = Global Imports + Exports

Source: Own elaboration based on WTO

Figure 35: Services Trade Growth by Sector (2005-2019) - World and US



Source: Own elaboration based on US BEA Services trade data and WTO

As for attractiveness, we would ideally like to rely on concepts akin to PCI and/or COG as factors. However, for technical reasons, calculating these metrics using employment data does not yield convincing results.²⁰ Therefore, we use the level of wages of industries (in the United States) as a proxy for their degree of sophistication.

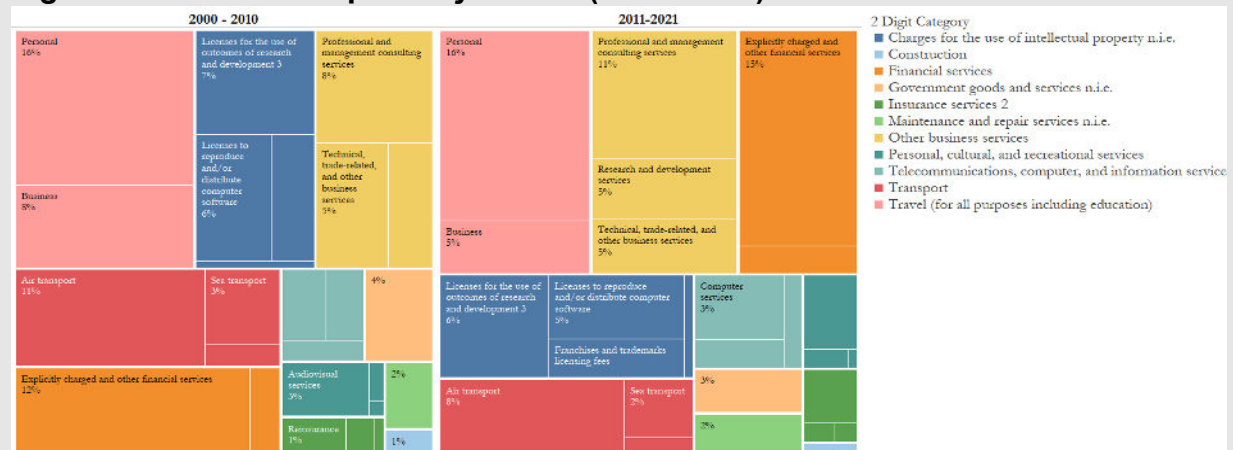
As in the case of goods, the implemented prioritization method requires that, for an industry to be selected as part of this identification process, it must be above the median of the industries selected based on demand (export growth) in the attractiveness factor, in case it comes from the intensive margin, and above the median of those industries both in the attractiveness and feasibility factors, in case of coming from the extensive margin.

As a result, 18 out of the initial set of 50 tradable industries are prioritized, which we then group into themes.

Box 4: A Proxy for Global Demand: Trends in US Services Exports

USA services exports are primarily composed of travel, business services, and financial services. In the most recent 10 years (2011-2021), travel, other businesses, and financial services dominate the USD 8.47 trillion USA export basket (Figure 37). More specifically, the USA primarily exports personal travel, related to education and other personal travel. Business services are mainly professional and management consulting, dominated by the subcategories legal, accounting, management consulting, public relations services, and advertising and related services. The financial services category, in turn, is dominated by financial management services.

Figure 36: Services Exports by Sector (2000-2021) - US



Source: Own elaboration based on US BEA Services trade data

The USA import basket looks somewhat different from that of its exports. The USA's import basket is about half the size of that of its services exports (USD 4.45 trillion) and is dominated by other business services, transport, and travel (Figure 38). Its business services imports are primarily professional and management consulting services. Transport imports are dominated by air transport and travel is primarily personal travel imports (i.e., USA nationals traveling abroad).

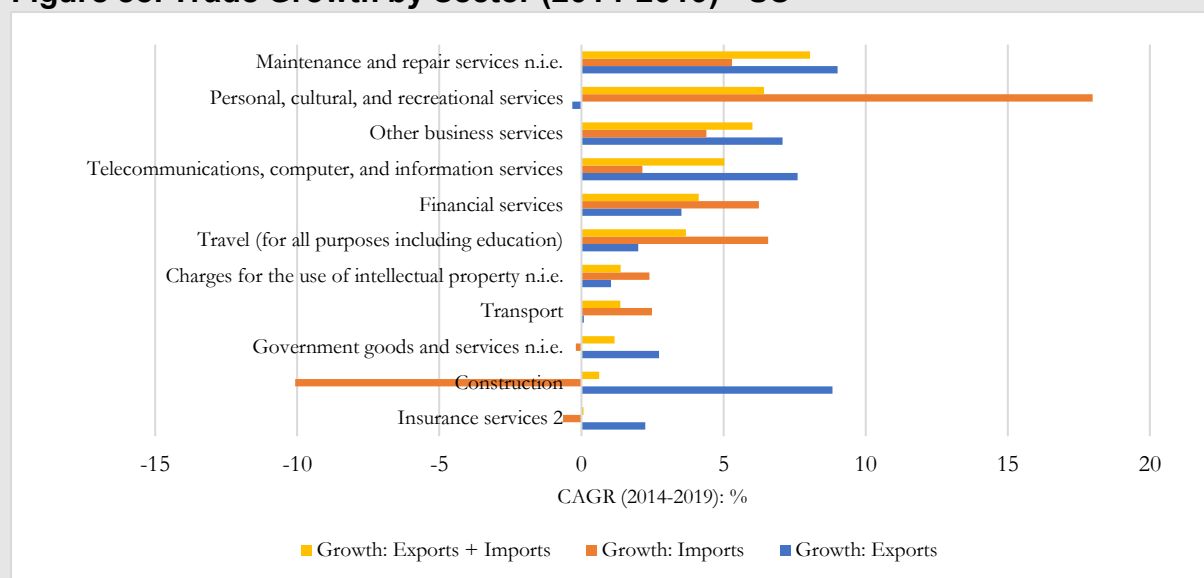
Figure 37: Services Imports by Sector (2000-2021) - US



Source: Own elaboration based on US BEA Services trade data

Similarly, we see heterogeneity in growth trends: not all service sectors grew at similar rates over 2014-2019. In terms of total trade (exports plus imports), maintenance and repair services, recreational services, and other business services grew the most in this period (Figure 39). Export growth trends parallel this slightly, in that sectors that witnessed the highest growth were also in maintenance and repair and other business services, as well as construction. Import sectors that grew the fastest include recreational services, travel, and financial services.

Figure 38: Trade Growth by Sector (2014-2019) - US



Source: Own elaboration based on US BEA Services trade data

It is also important to note that sectors with the largest growth rates are not always the largest in terms of value, and, in fact, there is no obvious relationship between the size of a service category and its growth rate. Figure 40 illustrates how even though maintenance, repair, and personal cultural services are growing the fastest, the largest sectors are other business services, financial services, and travel. This variation is also visible at a more disaggregated

service sector level, in Figure 41, where each bubble represents a BEA Sector at the 3-digit level. For example, within telecommunications, computer services are the fastest-growing sub-sector, while telecommunications services are the least growing. In the case of other business services, professional and management counseling services have the highest growth rate.

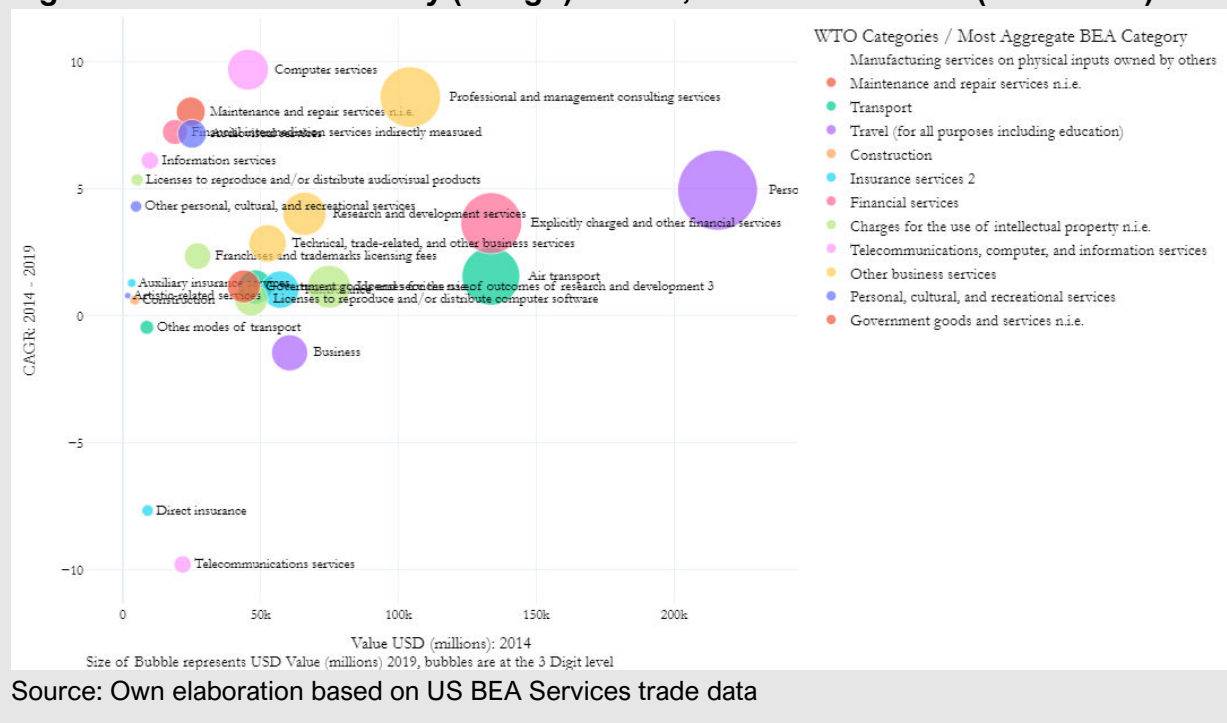
Analyzing trends in USA services growth and market share presents some illustrative findings for the UAE's future diversification trajectory. Through the USA data, we find that even if a broad sector is ostensibly growing fast, one specific subcategory could be growing or driving that aggregate growth more than other subcategories. Thus, we incorporate this granular data into the sector prioritization framework, where we choose to focus on tradable services with high growth for the USA.

Figure 39: Services Trade by (2-Digit) Sector, Value and Growth (2014-2019) - US



Source: Own elaboration based on US BEA Services trade data

Figure 40: Services Trade by (3-Digit) Sector, Value and Growth (2014-2019) - US



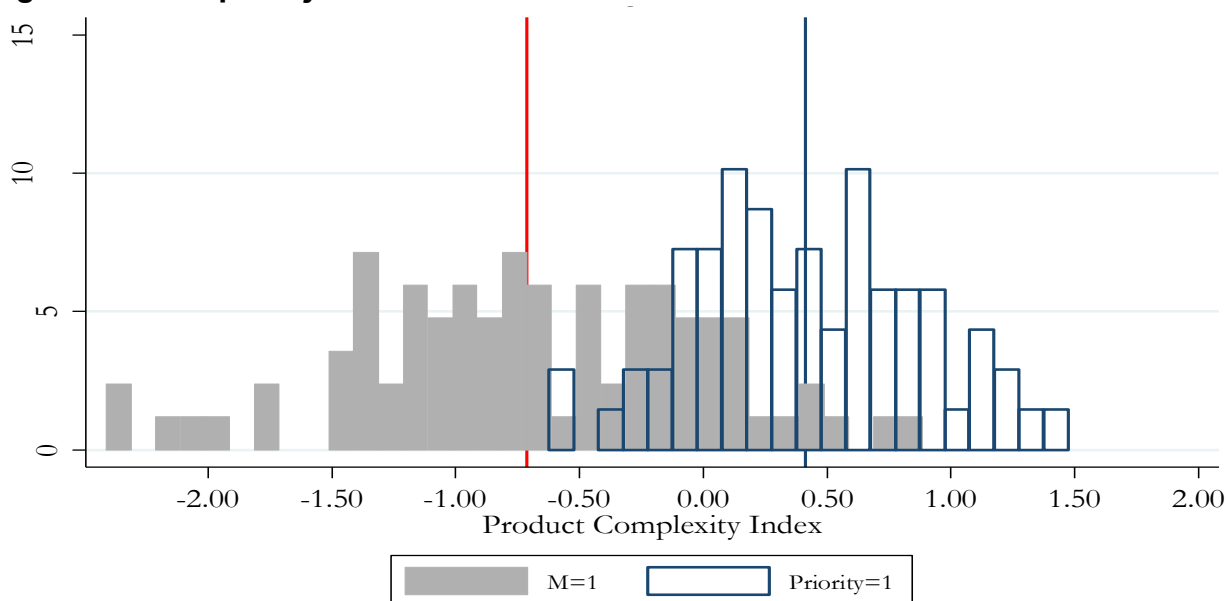
6.2 Diversification Opportunities

6.2.1 Sector Identification and Potential Themes for Goods

Based on the complexity and demand metrics included in the sector identification process we prioritize 63 products, a number that is relatively close to the current product diversity of the country (84). In Figure 42, Figure 43, and Figure 44 below we describe the complexity, export growth, and energy intensity of these selected products, respectively, and, as a reference, we compare them to that of the products in which the country currently has a revealed comparative advantage. In general terms, it is possible to state that the goods identified by the prioritization framework are more complex, show higher export growth, and include less energy-intensive products than current areas of strength of the UAE. On this last point, it is also worth highlighting that among the selected products, eight of them (11.5%) are considered green products according to Mealy and Teytelboym (2022).²¹ In contrast, out of 84 that make up the UAE's current diversity, only 3 are classified as green (3.6%).

²¹ Mealy and Teytelboym (2022) characterize good products by compiling three publicly available lists that were discussed in multilateral organizations, assembling to our knowledge the most commonly used list of green products in the HS nomenclature.

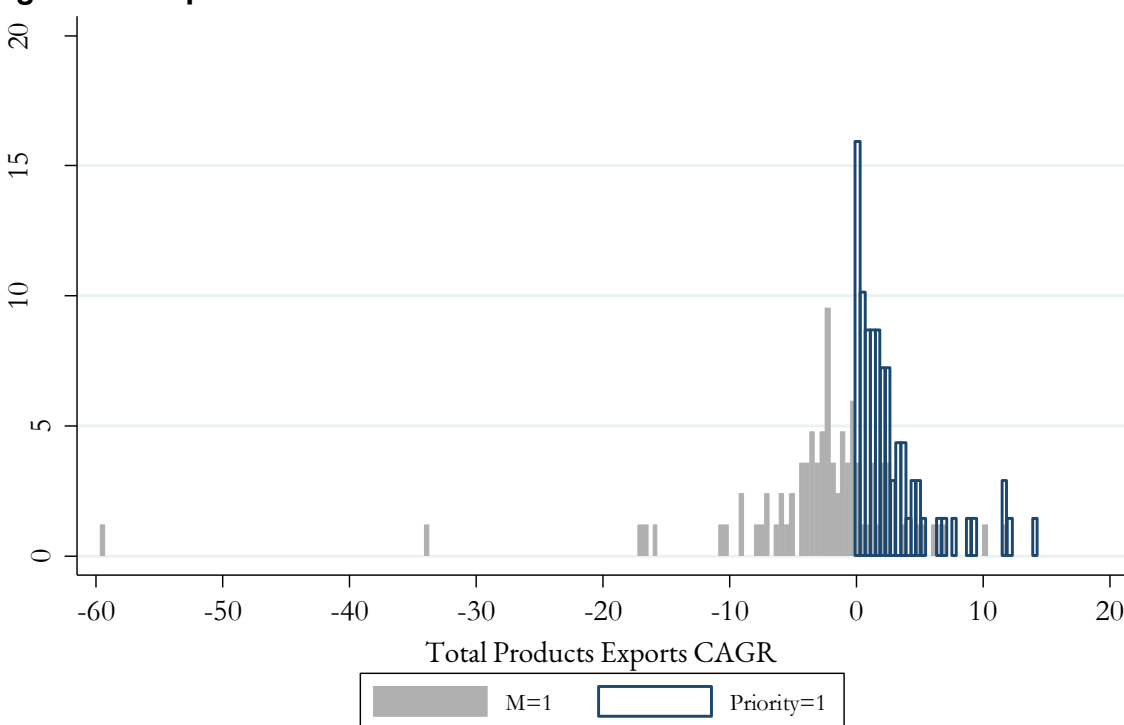
Figure 41: Complexity Distribution of Current and Selected Products - UAE



Note: Red and blue lines represent current ECI and the ECI resulting from the selected products, respectively

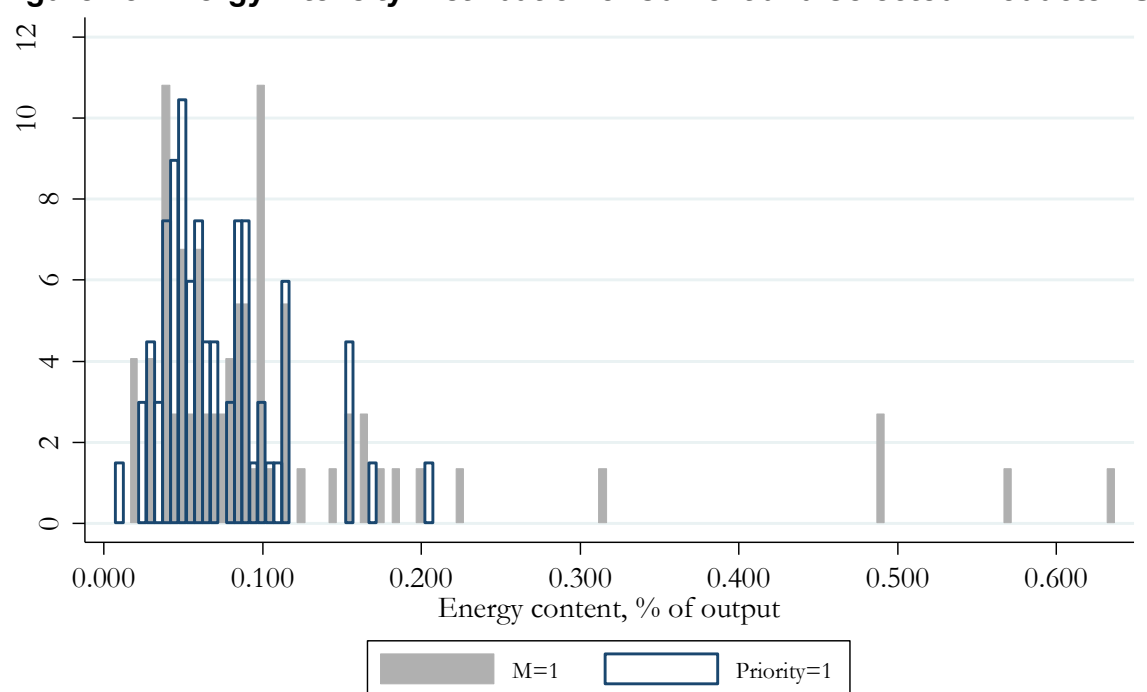
Source: Own elaboration based on COMTRADE and WTO

Figure 42: Exports Growth Distribution of Current and Selected Products - UAE



Source: Own elaboration based on COMTRADE and WTO. Note: Priority refers to products that are prioritized in our algorithm, while M refers to products where there is a comparative advantage.

Figure 43: Energy Intensity Distribution of Current and Selected Products - UAE



Source: Own elaboration based on COMTRADE, WTO and BEA. Note: Priority refers to products that are prioritized in our algorithm, while M refers to products where there is a comparative advantage.

At this point, we cluster these identified products into themes to optimize eventual policy design and efforts to favor productive diversification.²² The logic of this step is that resources would be most effectively used if targeted toward collections of related products as opposed to very specific ones. The resulting themes and subthemes related to the production of goods include:

- Food and beverages
- Metals and materials
- Chemicals
- Plastics and rubbers
- Machinery and vehicles

For each one of them, we include below, first, the details of the specific products that form part of them and were selected based on the identification process detailed above. Second, figures summarizing their relative performance in key complexity and demand indicators. Third, a table listing the largest players in the UAE and the world to give a better sense of the type of companies that are involved and could be targeted.

²² A small number of products was also manually filtered out at this stage, in cases that were easily justifiable.

6.2.1.1 Theme 1: Food & Beverages

Food and beverage (F&B) manufacturing is a relevant sector in the UAE economy. According to a report by the Dubai Chamber of Commerce and Industry, the UAE's F&B manufacturing industry was valued at AED 46.1 billion in 2019 and is expected to grow at a compound annual growth rate of 4.3% until 2024. The sector is also witnessing some innovation and capacity expansion, as local and foreign investors are establishing new production facilities and launching new products to meet the growing demand of the domestic and regional markets. Some of the leading F&B manufacturing companies in the UAE include United Foods Company, Delta Food Industries, Dubai Refreshment, Al Ain National Juice and Refreshments, Emirates Refreshments and International Beverage, and Filling Industries.

Within F&B, the UAE seems well positioned for the manufacturing of products relating to confectionery items, preserved meat, and fermented beverages. There is a sizeable domestic and regional demand for the sector and the entry of international companies has been critical to its expansion. Products such as chocolates may be promising for the UAE given an increase in regional demand for luxury and premium products, and an increasing preference for gifting chocolates during holidays. Figure 45 details the products that were selected based on the identification process and grouped into the Food and Beverages theme.

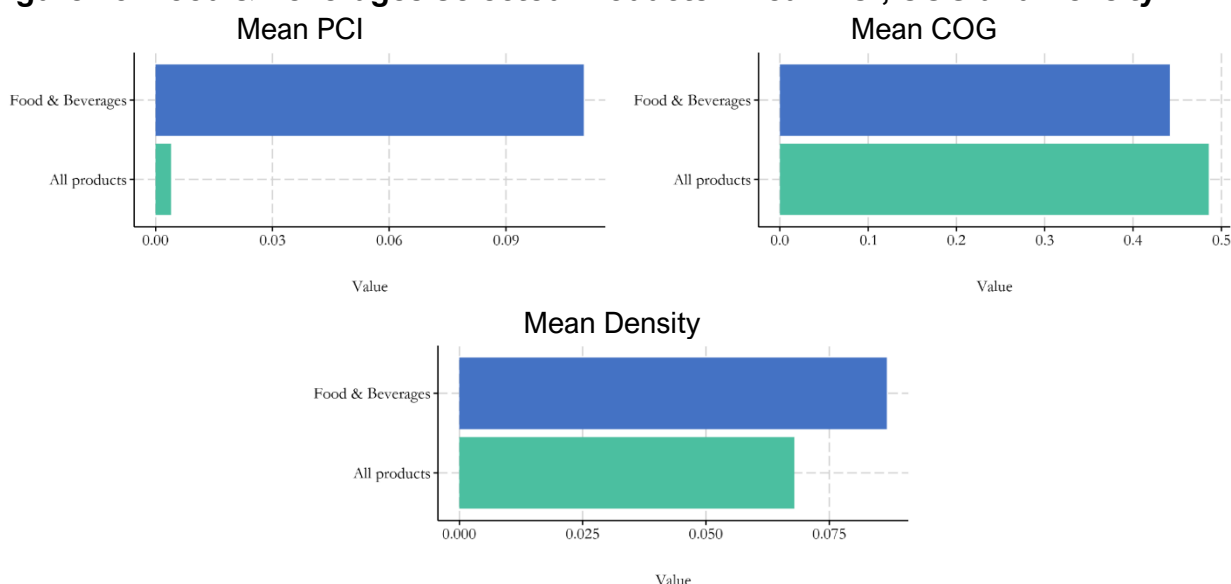
Next, Figure 46 summarizes the relative average performance of these products in terms of PCI, COG, and density, while Figure 47 lists the largest players that are engaged in the production of these products in both the UAE and the world.

Figure 44: Food & Beverages Selected Products

Extensive Margin Products	Intensive Margin Products
Other prepared or preserved meat	Soups and broths
Chocolates	
Malt extract	
Ice cream	
Food preparations n.e.c.	
Other fermented beverages	

Source: Own elaboration.

Figure 45: Food & Beverages Selected Products - Mean PCI, COG and Density



Source: Own elaboration based on COMTRADE and WTO

Figure 46: Top Companies in the UAE and the World / Food and Beverages

Top 5 companies by employment in UAE	Top 5 companies in the world	Present in the UAE?
Mr. Food Industries	Mars	Yes
Do Freeze LLC	Ferrero	No
La Ronda Emirates	Mondelez International	Yes
Strategic Foods International	Nestle	Yes
General Food Processing Ind.	Unilever	Yes (Rep Office)

Source: Own elaboration based on Dun and Bradstreet and National Economic Registry

6.2.1.2 Theme 2: Metals & Materials

Metals and materials are important to the UAE, especially as they are major inputs to sectors of strength for the country such as construction, engineering, and energy. The UAE already has a well-established metal and steel trading industry, with leading companies that export, import, and supply various products and services to different sectors of the economy. In terms of metals, the UAE seems well-positioned for the manufacturing of products related to downstream metals.

The glass-related packaging market emerges in the analysis as a possible area of potential for the UAE. These products may have market potential given the growing global demand from the pharmaceutical sector. The UAE government's commitment and partnerships

aimed at expanding the pharmaceutical activity in the country can further provide a domestic market for glass-related packaging. Figure 48 details the products that were selected based on the identification process and grouped into the Metals and Materials theme.

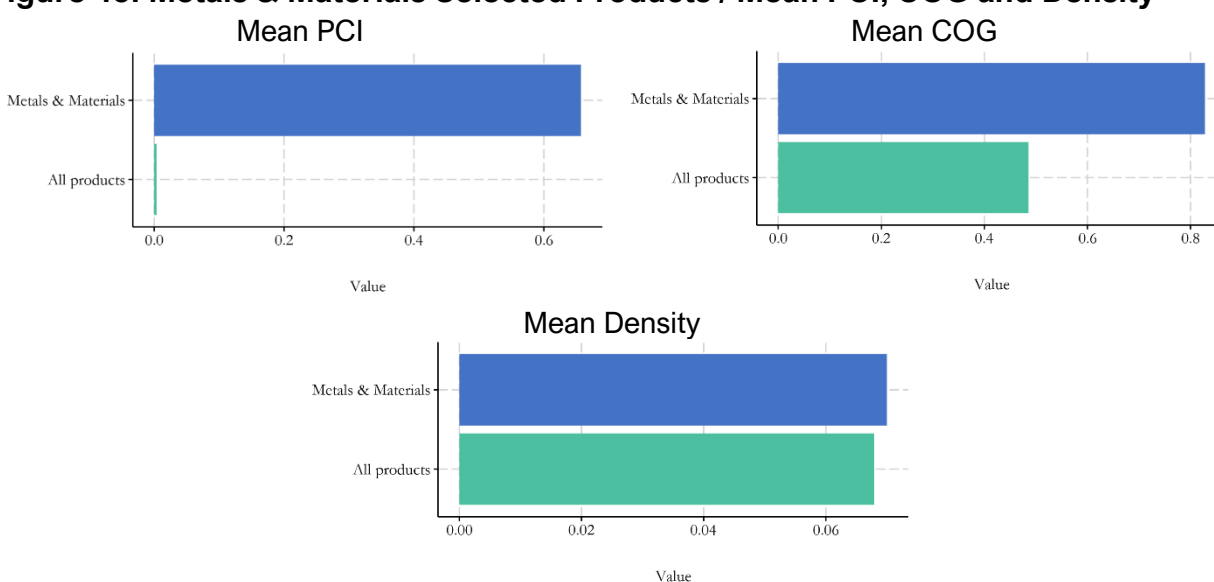
Next, Figure 49 summarizes the relative average performance of these products in terms of PCI, COG and density, while Figure 50 lists the largest players that are engaged in the production of these products in both the UAE and the world.

Figure 47: Metals & Materials Selected Products

Extensive Margin Products	Intensive Margin Products
Newsprint	Tissue
Toilet paper	Glass containers for conveyance
Bobbins, spools, cops of paper	Synthetic precious stones
Natural or artificial abrasive powder	Slag, ash and residues containing metals
Mineral wools and insulating materials	Structures and their parts, of iron or steel
Panels of vegetable fibers	Cadmium
Articles of stone or of other mineral substances	Stoppers, caps and lids of metal
Safety glass	Compounds of rare-earth metals
Glass fibers	
Platinum clad metals	
Coin	
Peat	
Oils etc. from high temperature coal tar	
Aluminum powders	
Aluminum plates > 0.2 mm	
Aluminum structures (bridges, towers etc)	

Source: Own elaboration.

Figure 48: Metals & Materials Selected Products / Mean PCI, COG and Density



Source: Own elaboration based on COMTRADE and WTO.

Figure 49: Top Companies in the UAE & the World / Metals & Materials

Top 5 companies by employment in UAE	Top 5 companies in the world	Present in the UAE?
Al Taweelah Alumina	ArcelorMittal SA	Yes
Dubai Aluminum	Ansteel Group	No
Al Jaber Aluminum	Saudi Arabian Mining Corp	No
Al Jazira Metal Industries Co. LLC	Rio Tinto Group	Yes
Basf FZE	Salt Groupe SAS	No

Source: Own elaboration based on Dun and Bradstreet and National Economic Registry

6.2.1.3 Theme 3: Chemicals

The UAE has displayed a competitive advantage in the manufacturing of several chemical products. This may be related to its abundant natural resources, strategic location, and supportive infrastructure. Some of the most promising products that are produced or can be produced by chemical manufacturing in the UAE include dyes, makeup, lab reagents, and other specialty chemicals. These products are in demand in various industries such as textiles, cosmetics, pharmaceuticals, and research.

Within chemical products, fragrances and perfumes emerged from the analysis as a high-potential chemical product, which is consistent with the UAE's global reputation in this area and its integral position in local culture and traditions. The UAE could also possibly expand into newer chemical products such as laboratory reagents by leveraging existing capabilities in related products such as enzymes, breathing appliances, instruments for physical or chemical analysis, navigational instruments, and lubricant reagents. The UAE healthcare sector and medical tourism services could also provide domestic demand for some of these products. Figure 51 details the products that were selected based on the identification process and grouped into the Chemicals theme.

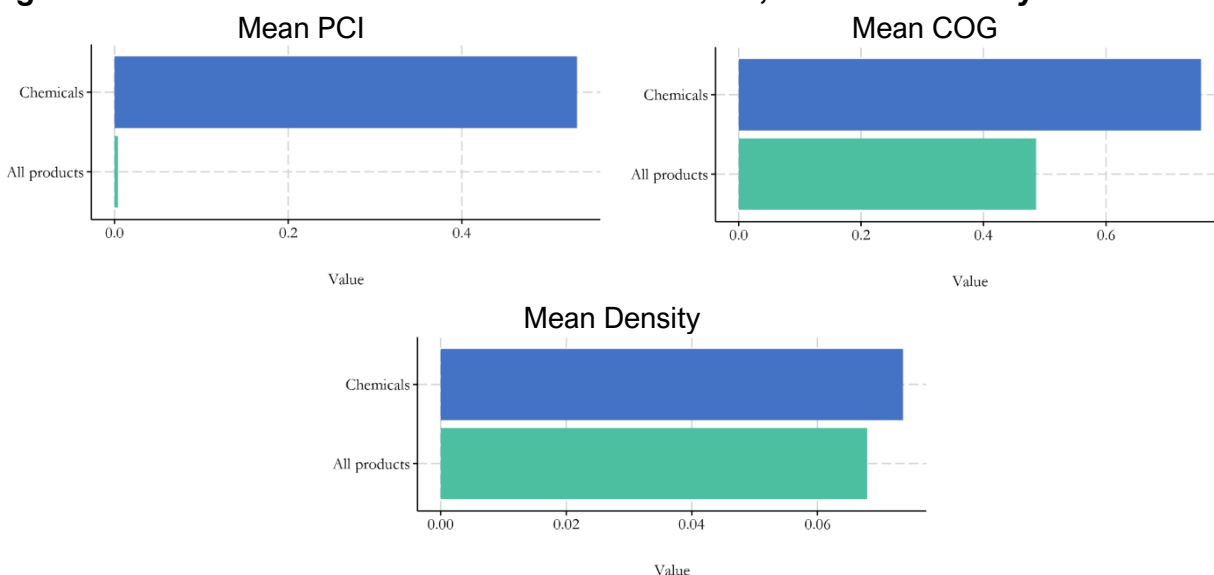
Next, Figure 52 summarizes the relative average performance of these products in terms of PCI, COG, and density, while Figure 53 lists the largest players that are engaged in the production of these products in both the UAE and the world.

Figure 50: Chemicals Selected Products

Extensive Margin Products	Intensive Margin Products
Sodium hydroxide	Prepared driers
Non-radioactive isotopes	Perfumes
Halogenated derivatives of hydrocarbons	Hair products
Medicaments, packaged	Photographic film, not developed
Other coloring matter	
Paints and varnishes, aqueous	
Glaziers' putty	
Make-up preparations	
Toiletries	
Cleaning products	
Finishing agents	
Diagnostic or laboratory reagents	

Source: Own elaboration.

Figure 51: Chemicals Selected Products / Mean PCI, COG and Density



Source: Own elaboration based on COMTRADE and WTO.

Figure 52: Top Companies in the UAE & the World / Chemicals

Top 5 companies by employment in UAE	Top 5 companies in the world	Present in the UAE?
ADNOC Distribution Oil & Grease Factory	Procter & Gamble	Yes
ConMix Ltd.	Dow	Yes
Neopharma LLC	Basf	Yes
Corrotech Construction Chemicals	Fineotex Chemical Ltd.	Yes
Al Nahda International Chemicals	Johnson & Johnson	Yes

Source: Own elaboration based on Dun and Bradstreet and National Economic Registry

6.2.1.4 Theme 4: Plastics & Rubber

The plastics and rubber theme revolves around the production and trade of various materials and products, including polyacetals, monofilament, other plates of plastics (noncellular and not reinforced), other plastic plates, sheets, synthetic rubber, and vulcanized rubber tubes. These materials are important components in a wide range of industries, such as automotive, construction, packaging, and consumer goods, as can be seen in the input-output matrices of countries like the United States or Mexico. The country's abundant hydrocarbon resources provide a competitive advantage in the production of raw materials for plastics and synthetic rubber.

Several of the products recommended in this theme serve as input for other industries. According to the Business Research Company (The Business Research Company 2022) products like synthetic rubber are currently being consumed more than their natural counterparts as these new “smart polymers” tend to provide more reliability and higher performance. The market for these products is projected to grow globally, especially in polyacetals and synthetic rubber, where Businesswire (Grand View Research 2022) expects the polyacetal industry to grow at a 5.6% CAGR due to its uses in the industrial machinery and automotive industries.

The main threat for this kind of product globally may have to do with the green transition and the use of hydrocarbons, as plastics manufacturing comprises around 4 to 8% of the global oil demand. However, according to the World Economic Forum (2022), the market for plastics is still expected to grow until 2050, even as the world moves away from oil-based products. Figure 54 details the products that were selected based on the identification process and grouped into the Plastics and Rubber theme.

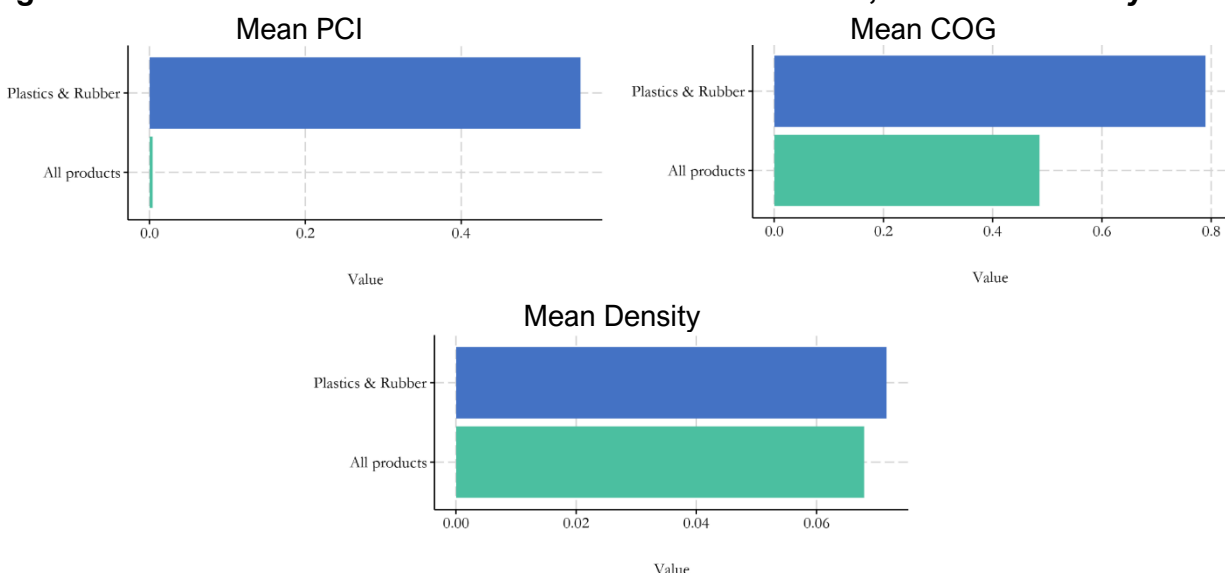
Next, Figure 55 summarizes the relative average performance of these products in terms of PCI, COG, and density, while Figure 56 lists the largest players that are engaged in the production of these products in both the UAE and the world.

Figure 53: Plastics & Rubber Selected Products

Extensive Margin Products	Intensive Margin Products
Polyacetals	
Monofilament	
Other plates of plastics, noncellular and not reinforced	
Other plastic plates, sheets etc.	
Synthetic rubber	
Vulcanized rubber tubes	

Source: Own elaboration.

Figure 54: Plastics & Rubber Selected Products / Mean PCI, COG and Density



Source: Own elaboration based on COMTRADE and WTO

Figure 55: Top Companies in the UAE & the World / Plastics & Rubber

Top 5 companies by employment in UAE	Top 5 companies in the world	Present in the UAE?
NRS International	Exxon Mobil Corp.	Yes
Balmer Lawrie UAE LLC	LG Chem Ltd.	No
Advanced Pipes and Cast	Total Energies SE	Yes
Modern Plastic Company	China Petroleum and Chemical Corp	Yes
Al Samir Plastic Factory	Saudi Basic Industries Corp.	Yes

Source: Own elaboration based on Dun and Bradstreet and National Economic Registry

6.2.1.5 Theme 5: Machinery & Vehicles

The machinery and vehicles theme involves a diverse range of products, such as railway cars (not self-propelled), cars, trailers, and semi-trailers, spark-ignition reciprocating internal combustion piston engines, centrifuges, other lifting machinery, harvesting or agricultural machinery, other agricultural machinery, parts of military weapons, and radar systems. These products provide physical capital and inputs to various industries and sectors, including transportation, agriculture, defense, and manufacturing, which highlights its significance to the UAE's economic development and diversification efforts.

While the UAE does not currently produce railway cars, its current exports suggest that the country may have capabilities close to those required to manufacture this product and allow it to support regional projects such as the Etihad Rail that will connect Saudi Arabia to the UAE. In addition, the market for cars and related products is expected to continue growing at a rate of between 2% to 5% globally, and the UAE currently has an important re-export industry that could potentially be leveraged to get access to the inputs it needs. Free Zones such as Jebel Ali Free Zone and Hamriyah have proved to be an important base for companies manufacturing or re-exporting different types of machinery.

Other products as parts of military weapons and radar, provide an important opportunity for the UAE to continue diversifying its economic capabilities as it continues to grow as an important global defense market, in an industry that has been growing at close to a 4% rate in the last 20 years. Offset agreements represent a valuable tool for the UAE government to help improve its domestic productive capabilities in those areas. Figure 57 details the products that were selected based on the identification process and grouped into the Machinery and Vehicles theme.

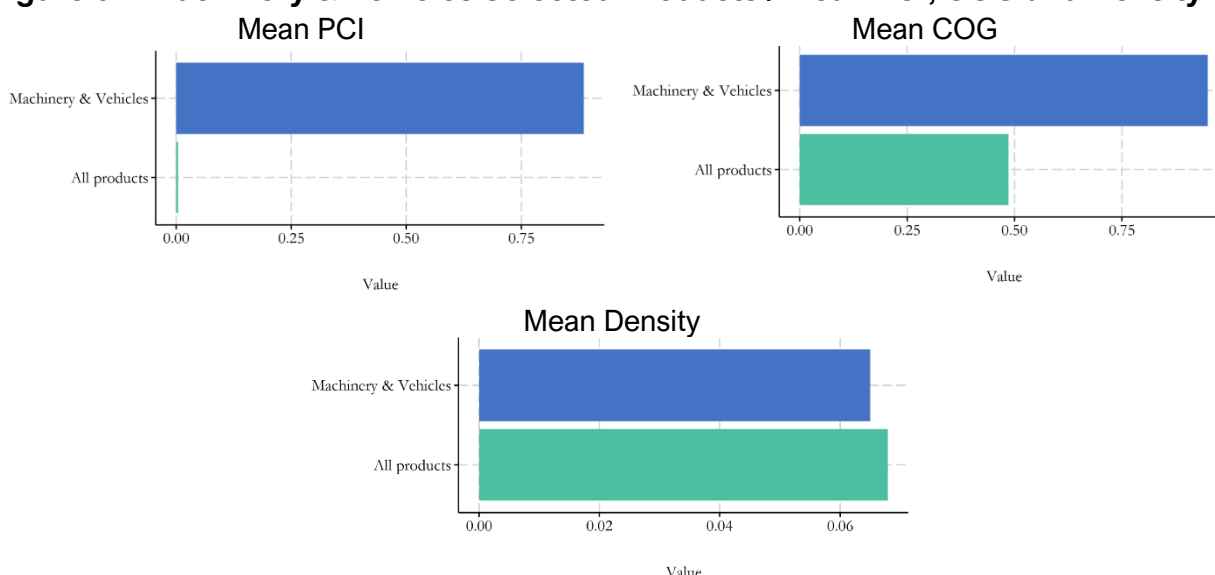
Next, Figure 58 summarizes the relative average performance of these products in terms of PCI, COG, and density, while Figure 49 lists the largest players that are engaged in the production of these products in both the UAE and the world.

Figure 56: Machinery & Vehicles Selected Products

Extensive Margin Products	Intensive Margin Products
Railway cars, not self-propelled	
Cars	
Trailers and semi-trailers	
Spark-ignition reciprocating internal combustion piston engines	
Centrifuges	
Other lifting machinery	
Harvesting or agricultural machinery	
Other agricultural machinery	
Parts of military weapons	
Radar	

Source: Own elaboration.

Figure 57: Machinery & Vehicles Selected Products / Mean PCI, COG and Density



Source: Own elaboration based on COMTRADE and WTO

Figure 58: Top Companies in the UAE & the World / Machinery & Vehicles

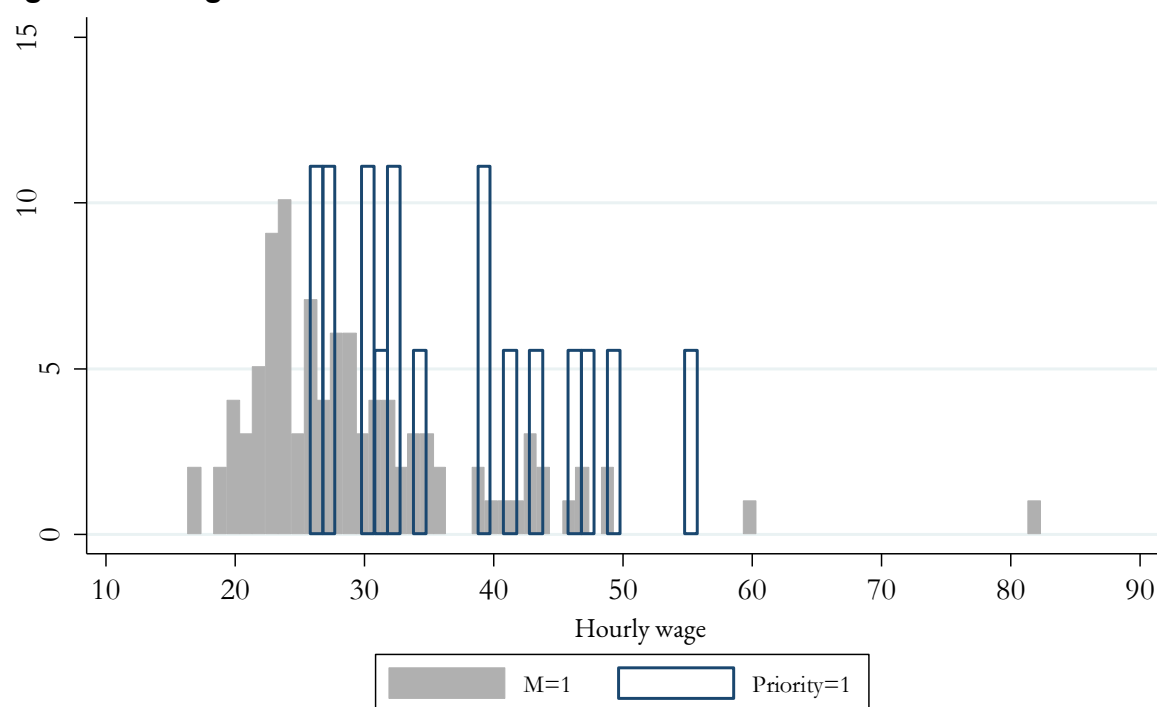
Top 5 companies by employment in UAE	Top 5 companies in the world	Present in the UAE?
Dolphin Manufacturing Ltd.	Caterpillar	Yes (Not Manufacturing)
Sabah Cars Ind.	Toyota	Yes (Representative Office)
Gorica Industries LLC	Volkswagen	Yes (Representative Office)
Ashok Leyland	Raytheon	Yes (Representative Office)
Tawazun Industries Precision	Airbus SAS	Yes

Source: Own elaboration based on Dun and Bradstreet and National Economic Registry

6.2.2 Sector Identification and Potential Themes for Services

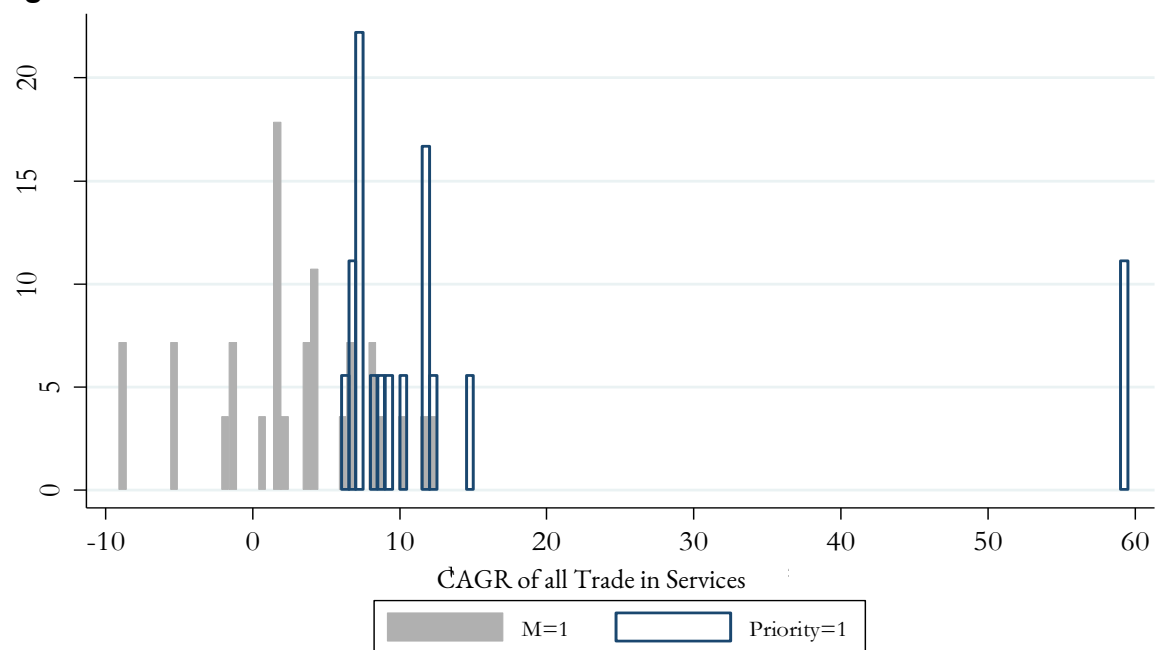
In the case of services, 18 industries are prioritized based on the process described above. In Figure 60 and Figure 61 below we describe the wage distribution and trade growth of these selected services, respectively, and, as a reference, we compare them to that of the products in which the country is currently intensive. In general terms, it is possible to state that the sectors prioritized tend to pay higher wages – a proxy we're using for relative sophistication- and show higher export growth in relation to the current ones.

Figure 59: Wage Distribution of Current and Selected Industries - UAE



Source: Own elaboration based on NER, ORBIS and BLS. Note: Only considering services tradable industries for current industries. Priority refers to products that are prioritized in our algorithm, while M refers to products where there is a comparative advantage.

Figure 60: Trade Growth Distribution for Current and Selected Industries - UAE



Source: Own elaboration based on NER, ORBIS and BEA. Note: Only considering services tradable industries for current industries. Priority refers to products that are prioritized in our algorithm, while M refers to products where there is a comparative advantage

With the same as for goods, in the case of services we also cluster the selected industries into themes. The themes are:

- ICT
- Business services
- Financial services
- Healthcare
- Creative industries and tourism

For each one of them, we include below, first, the details of the specific industries in the services that form part of them and were selected based on the identification process detailed above. Second, figures summarizing their relative performance in key complexity and demand indicators. Third, a table listing the largest players in the UAE and the world to give a better sense of the type of companies that are involved and could be targeted.

6.2.2.1 Theme 6: ICT

The ICT sector in the UAE holds one of the keys to supporting the country's vision of building a competitive knowledge economy, both as a high-productivity economic sector itself and as an enabler for other economic activities. The sector is broad and encompasses the various industries that produce, distribute, or enable the use of information and communication technologies. The ICT services industries identified as playing a key role in the UAE are wholesale electronic markets and agents and brokers, data processing, hosting, and related services, other information services, and computer systems design and related services.

The UAE seems well positioned for data processing given that its data center market is expected to grow by 7.9% from 2022 to 2027 and is competitive among GCC peers, possibly due to the presence of two “smart cities”. The UAE has large domestic players leading the transformation of this industry and is also expected to receive investment from international players such as Amazon Web Services. On the other hand, the country faces the natural challenge of high temperatures in the summer, thus requiring increased cooling systems to support this industry, translating to higher energy and water costs. As a result, data centers may be one of the service industries for which the green transition will prove the most crucial.

Enhancing activities related to computer systems design and related services aligns well with global trends. US trade trends show that the software and services segment of the ICT industry has received increased investments. In line with this, the UAE is forecasted to increase its spending in this industry, promote flexible and long-term visa schemes to attract highly skilled workers and partner with private companies for training. Figure 62

details the industries that were selected based on the identification process and grouped into the ICT theme.

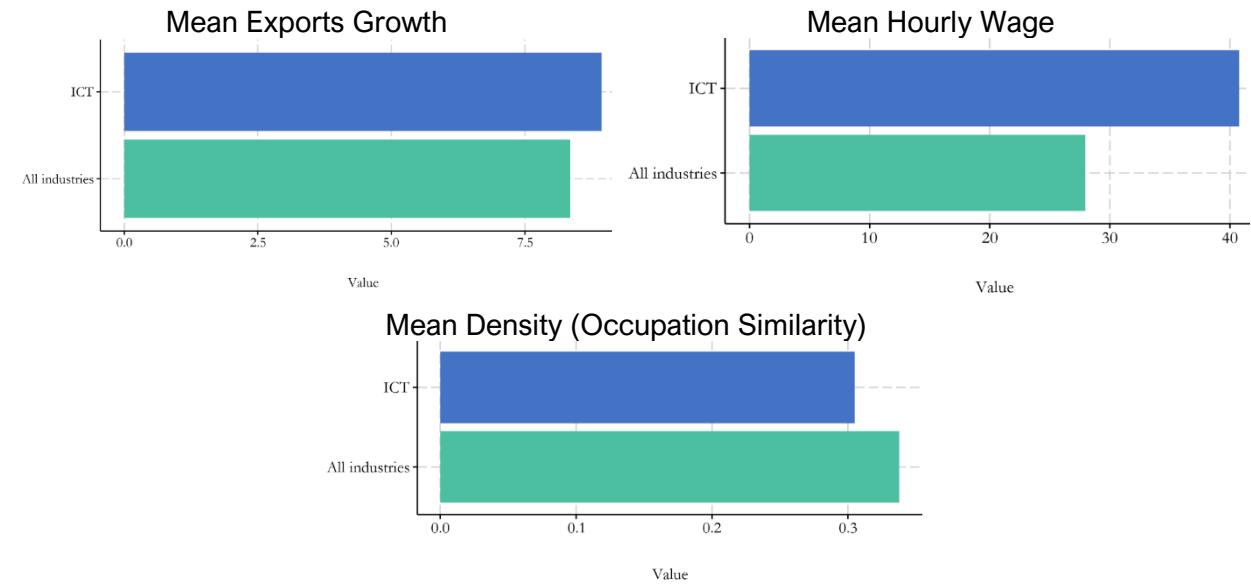
Next, Figure 63 summarizes the relative average performance of these industries in terms of export growth, hourly wages, and density, while Figure 64 lists the largest players that are engaged in the production of these industries in both the UAE and the world.

Figure 61: ICT Selected Industries

Extensive Margin Products	Intensive Margin Products
	Wholesale Electronic Markets and Agents and Brokers
	Data Processing, Hosting, and Related Services
	Other Information Services
	Computer Systems Design and Related Services

Source: Own elaboration.

Figure 62: ICT Selected Industries / Mean Exports Growth, Hourly Wage and Density



Source: Own elaboration based on COMTRADE and WTO

Figure 63: Top Companies in the UAE & the World / ICT

Top 5 companies by employment in UAE	Top 5 companies in the world	Present in the UAE?
SAP	Amazon	Yes
SecureTech	Alibaba	Yes (Representative Office)
Business Communications LLC	Google	Yes
ComArch Middle East	Microsoft	Yes
ValueLabs FZ - LLC	Oracle	Yes

Source: Own elaboration base on Dun and Bradstreet and National Economic Registry

6.2.2.2 Theme 7: Business Services

The Business Services theme comprises various industries that cater to the needs of enterprises operating in this rapidly evolving business environment. The UAE's focus on expanding its non-oil economy has led to increased demand for these services, supporting the development of various industries and attracting foreign investment. Legal, management, scientific, and technical consulting services offer expertise to help organizations navigate industry-specific challenges and improve their operations. Meanwhile, employment services include recruiting and headhunting, which helps regional companies with talent acquisition and workforce management in a country with access to a workforce with a diverse set of origins. This theme is especially important for the UAE as it looks to further establish itself as a hub for regional headquarters of global companies.

Within this theme, several important industries for the UAE include digital advertising, interior design, management consulting, and legal services. In the case of interior design, according to Businesswire (2023), it is a 150 billion industry that will continue to grow at a 7.8% rate until 2027.²³ This is especially important for the UAE, as it is a key support service within Construction, which is a key sector in the country's industry space.

As for management consulting and the provision of legal services, these industries comprise 45% of all consulting services traded within the GCC market, the UAE is the second largest player in the region and several consulting firms have established regional headquarters. This is important in the context of a regional market that has been growing in double digits during the past few years according to Source Global Research and in the context of new trade agreements being signed by the UAE where firms will need help

²³ This industry is part of the Specialized Design Services code

navigating its new environment. A key challenge for the country remains in allowing small local boutique firms to participate in bigger projects as they comprise more than 58% of the firms in the UAE, according to ConsultancyME. Figure 65 details the industries that were selected based on the identification process and grouped into the business services theme.

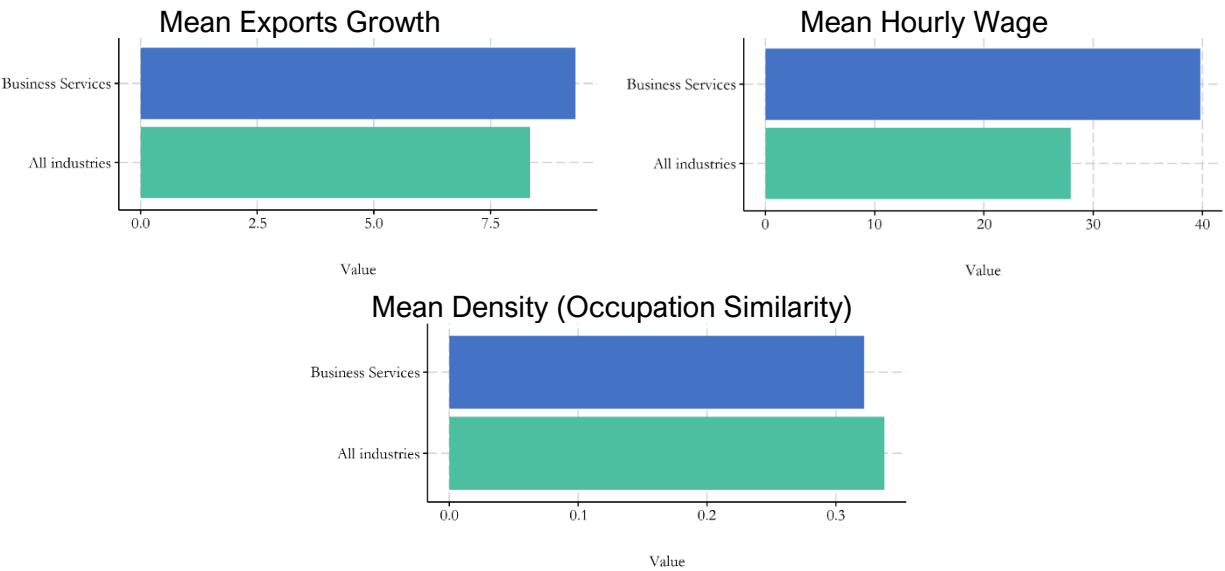
Next, Figure 66 summarizes the relative average performance of these industries in terms of export growth, hourly wages, and density, while Figure 67 lists the largest players that are engaged in the production of these industries in both the UAE and the world.

Figure 64: Business Services Selected Industries

Extensive Margin Products	Intensive Margin Products
Legal Services	Specialized Design Services
Advertising, Public Relations, and Related Services	Management, Scientific, & Technical Consulting Services
Employment Services	

Source: Own elaboration.

Figure 65: Business Services Selected Industries / Mean Exports Growth, Hourly Wage and Density



Source: Own elaboration based on COMTRADE and WTO

Figure 66: Top Companies in the UAE & the World / Business Services

Top 5 companies by employment in UAE	Top 5 companies in the world	Present in the UAE?
EFM Group LLC	Bain & Co	Yes
Reach Employment Services LLC	Boston Consulting Group	Yes
PWC Middle East FZ	McKinsey & Company	Yes
MicroStrategy LLC	Deloitte	Yes
Al Nisr Publishing LLC	Accenture	Yes

Source: Own elaboration base on Dun and Bradstreet and National Economic Registry

6.2.2.3 Theme 8: Financial Services

The Financial Services theme encompasses a diverse range of industries, including depository credit intermediation, non-depository credit intermediation, and activities related to credit intermediation. Depository credit intermediation, operating through traditional banks and Islamic financial institutions, plays a pivotal role in channeling funds between depositors and borrowers, supporting the UAE's economy. Non-depository credit intermediation, which includes finance companies and peer-to-peer lending platforms, offers alternative sources of credit to businesses and individuals, further bolstering economic growth and financial inclusion in the region. Activities related to credit intermediation, such as loan brokerage, financial advisory, and credit rating services, connect these sectors and ensure a well-regulated credit market in the UAE. Collectively, these Financial Services contribute to the robust financial ecosystem that underpins the nation's economic diversification efforts and its vision to become a diversified regional and global financial hub.

The UAE has a mature, stable, and digitally advanced financial services sector, with favorable regulations for capital flows, investments, and fintech as it is evidenced in some of its financial free zones. Despite localized shortcomings on the capital markets side and specialized product offerings, around 100 foreign banks have established a presence in the Dubai International Financial Centre (DIFC). Islamic finance has experienced robust growth in recent years, according to Oxford Business Group (2019), with most UAE banks enjoying a sound funding profile with deposits coming mainly from the public sector as per S&P.²⁴ In addition, both Abu Dhabi and Dubai have made regulatory improvements

²⁴ Around 30% of all deposits come from public sector companies and institutions.

aimed at enhancing their capital markets' outlook, as mentioned by Oxford Business Group (2020). Since 2017, both Emirates have worked to establish frameworks for a green finance sector. Led by state-owned enterprises such as First Abu Dhabi Bank and Masdar, the commitment to facilitating over 50 billion dollars in project financing for green projects over the next decade has been made. As the UAE pushes for decarbonization in various sectors, green finance will play a crucial role in supporting private sector projects. According to Morgan Lewis, green finance in the GCC is still an infant industry, although it has been growing strongly in recent years (6.4 billion market dollars in the GCC). Figure 68 details the industries that were selected based on the identification process and grouped into the financial services theme.

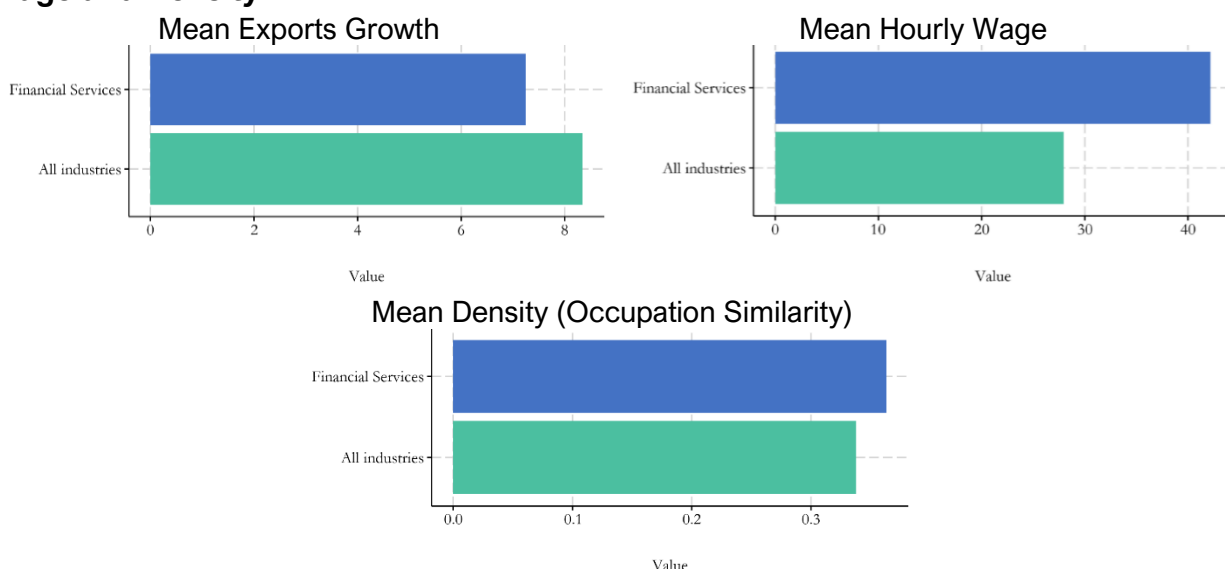
Next, Figure 69 summarizes the relative average performance of these industries in terms of export growth, hourly wages, and density, while Figure 70 lists the largest players that are engaged in the production of these industries in both the UAE and the world.

Figure 67: Financial Services Selected Industries

Extensive Margin Products	Intensive Margin Products
Depository Credit Intermediation	
Nondepository Credit Intermediation	
Activities Related to Credit Intermediation	

Source: Own elaboration.

Figure 68: Financial Services Selected Industries / Mean Exports Growth, Hourly Wage and Density



Source: Own elaboration based on COMTRADE and WTO

Figure 69: Top Companies in the UAE & the World / Financial Services

Top 5 companies by employment in UAE	Top 5 companies in the world	Present in the UAE?
First Abu Dhabi Bank	JP Morgan Chase Bank	Yes
Emirates NBD Bank	Bank of America	Yes (Representative Office)
National Bank of Ras Al Khaimah	Wells Fargo & Company	Yes (Representative Office)
Dubai Islamic Bank	HSBC Holding	Yes
Abu Dhabi Commercial Bank	Citigroup	Yes

Source: Own elaboration base on Dun and Bradstreet and National Economic Registry

6.2.2.4 Theme 9: Healthcare

The Healthcare theme encompasses a range of specialized services, including outpatient care centers, and inpatient services in generalists and specialty hospitals. These industries play a crucial role in delivering comprehensive and high-quality medical care, while also contributing to the country's economic growth and diversification efforts. As the UAE government prioritizes healthcare as a key sector in its economic diversification strategy, these industries also attract investments in healthcare infrastructure, research, and innovation. The growth of these specialized healthcare services supports the country's ambition to become a regional medical tourism hub, which allows it to draw patients from neighboring countries and its most important trading partners.

Medical tourism has been a growing industry in the world driven mainly by advancements in IT-related technologies and low-cost airlines, according to the OECD. These factors are particularly strong for the UAE as it can leverage its strong air transportation sector to support its mature healthcare system. According to Oxford Business Group (2020), medical tourism was growing in the UAE at a rate of 5.4% annually until COVID-19 and had a value of 13.7 billion dollars.

In terms of specialty hospitals, Abu Dhabi and Dubai have been able to grow and attract important players in the global healthcare market. Medical tourists typically travel to the UAE to get healthcare services in these specialties: dentistry, orthopedics, and dermatology, according to a report by Oxford Business Group (2021). When looking at the innovation in medical research from the UAE, dentistry is shown as an important sector where the country exhibits a comparative advantage in the publication and the patent space. Figure 71 details the industries that were selected based on the identification process and grouped into the healthcare theme.

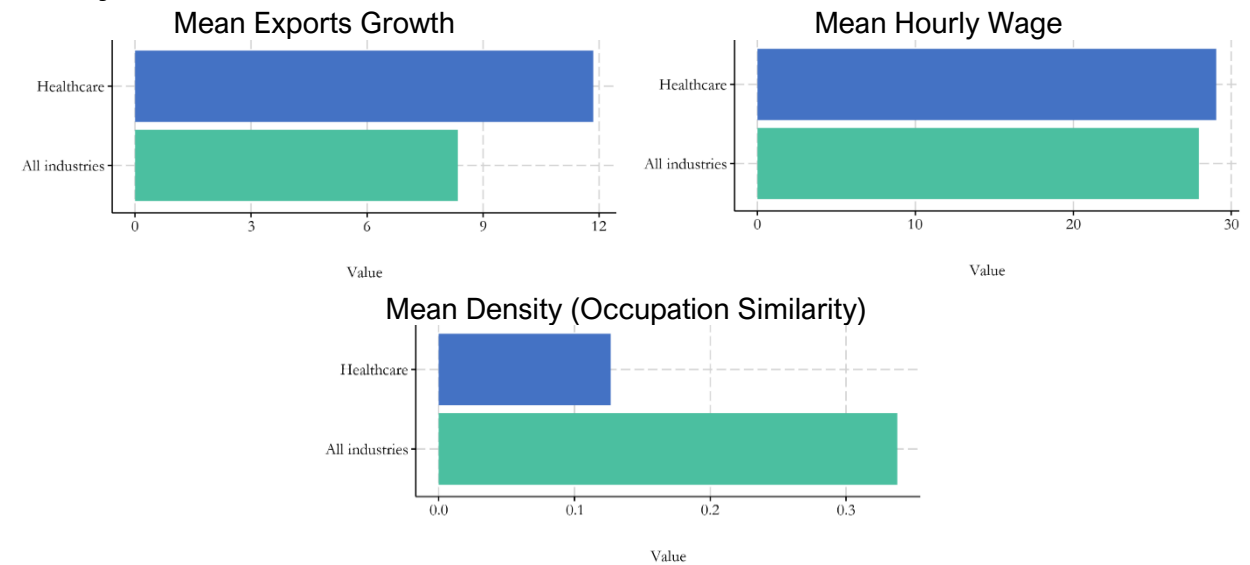
Next, Figure 72 summarizes the relative average performance of these industries in terms of export growth, hourly wages, and density.

Figure 70: Healthcare Selected Industries

Extensive Margin Products	Intensive Margin Products
Psychiatric and Substance Abuse Hospitals	Outpatient Care Centers
Specialty Hospitals	

Source: Own elaboration.

Figure 71: Healthcare Selected Industries / Mean Exports Growth, Hourly Wage and Density



Source: Own elaboration based on COMTRADE and WTO

6.2.2.5 Theme 10: Creative Industries & Tourism

The creative industries and tourism sector in the UAE are closely linked and mutually beneficial. The creative industries, such as motion picture and video industries and performing arts companies, contribute to the cultural diversity, social cohesion, and economic development of the UAE. They also attract tourists from around the world who seek to experience the rich and vibrant culture of the UAE. The tourism sector, in turn, provides a large and diverse market for the creative industries, as well as infrastructure and support services. The UAE has invested heavily in developing both sectors, recognizing their potential for growth and innovation.

The performing arts, sports, and entertainment-related industries have benefited from government initiatives and strategic visions. This growth is already seen with big players in the video production industry basing themselves in Dubai: such as Shahid and Starzplay Arabia. The launch of the National Strategy of the Cultural and Creative Industries in 2021 further set benchmarks for the growth of the sector over the next

decade, which would promote domestic activities in this sector. These visions have coincided with the strengthening of copyright laws that facilitate a conducive regulatory environment for creators. At the emirate level, Dubai and Ras Al-Khaimah have also sought to support the development of this sector with government strategic involvement and easing of regulatory frameworks. Figure 73 details the industries that were selected based on the identification process and grouped into the creative industries and tourism theme.

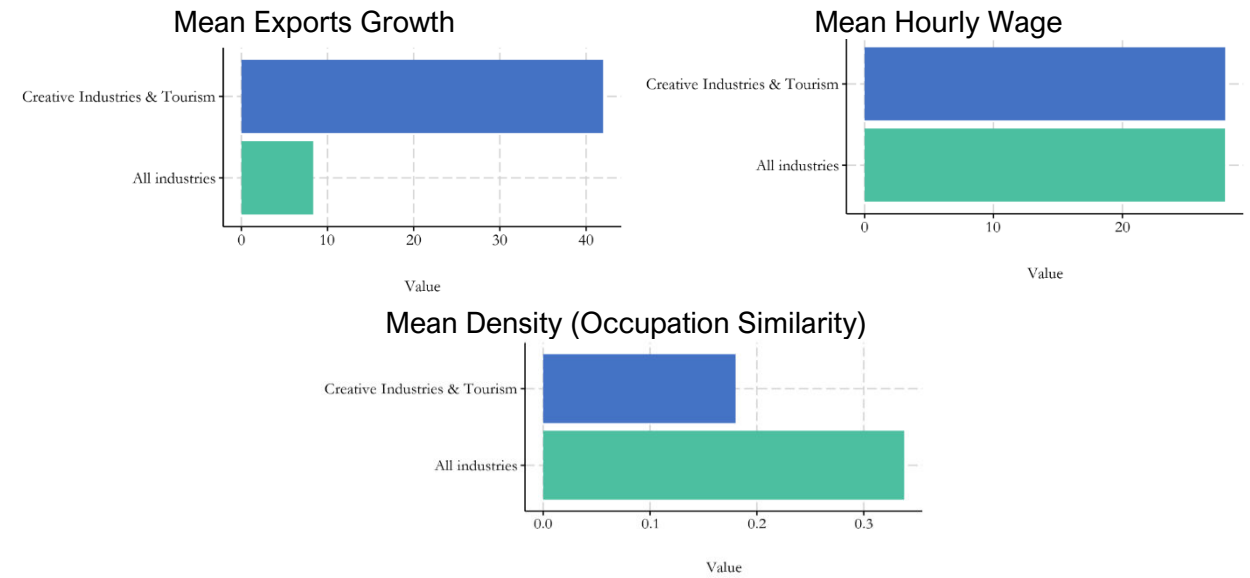
Next, Figure 74 summarizes the relative average performance of these industries in terms of export growth, hourly wages, and density, while Figure 75 lists the largest players that are engaged in the production of these industries in both the UAE and the world.

Figure 72: Creative Industries & Tourism Selected Industries

Extensive Margin Products	Intensive Margin Products
Motion Picture and Video Industries	
Performing Arts Companies	
Gambling Industries	

Source: Own elaboration.

Figure 73: Creative Industries & Tourism Selected Industries / Mean Exports Growth, Hourly Wage and Density



Source: Own elaboration based on COMTRADE and WTO

Figure 74: Top Companies in the UAE & the World / Creative Industries & Tourism

Top 5 companies by employment in UAE	Top 5 companies in the world	Present in the UAE?
Emirates Cable TV & Multi Media	Warner Media	No
Cine Royal Cinema	Walt Disney	Yes (Representative Office)
Jana Media Group	Comcast	Yes (Representative Office)
International Media Investments	Netflix	No
Starzplay Arabia	Paramount	Yes (Representative Office)

Source: Own elaboration base on Dun and Bradstreet and National Economic Registry

7. Conclusions

In this report, we have explored the diversification trajectory and productive structure of the economy of the UAE and identified an initial list of promising themes for further economic diversification. The basis of the analysis presented here arises from both exports and employment data, allowing for a comprehensive understanding of the UAE's relative comparative advantages in both goods and services.

Despite the significant role of oil in the country's overall export basket, other sectors have contributed to the UAE's current performance. In particular, the services and stone sectors account for a relevant 28% and 15% of total exports, respectively. More importantly, they represent 34% and 19% of total exports growth in recent years (between 2005 and 2019). At a more disaggregated level, relevant drivers have been precious metals and stones (19%), which includes gold, diamonds, and jewelry of precious metals, transport (12%), travel (11%), and other business services (6%). In particular, service exports have proven a stronger engine of diversification, building on a remarkable expansion path during recent years. In fact, the UAE is the second country in the reference group with the highest services exports growth in the period between 2005 and 2019, below only Qatar. As a result, during these years, service exports in the country increased by more than 3.5 times. The preponderant role of services in explaining the expansion of exports is largely due to the performance of the largest categories, Travel and Transport. Together, in practically equal parts, they explain 11% out of the 12% of total export growth.

Despite its successful diversification trajectory, the country shows a low level of economic complexity. The level of complexity shown by the UAE compares negatively with what is observed in its peers, even in the region. The low level of relative complexity of the UAE is explained, on the one hand, by the low relative share in diversity of “high-complexity” sections, and, on the other, by the low level of sophistication that the country shows within the different sections. In this vein, it is worth mentioning that –during the period 2005-2019- the UAE has kept low complexity products, losing a large number of products that improved its performance, without the effect of the ones won fully compensating for that loss. In this context, not even the positive performance shown in the services sectors helps the country show a more positive face. This is because the sectors in which the UAE has specialized are precisely the ones that, on average, present the lowest levels of complexity among the broad WTO services categories. In this sense, the fact that smaller service sectors, such as ICT and other business services, are growing even faster than travel and transportation is encouraging.

Even though the UAE also shows a relatively low COI, indicating that it is “far” from the most complex products, it is still possible to identify attractive and feasible diversification opportunities for the UAE. To this end, we devise a process and build the necessary datasets to evaluate the UAE’s revealed comparative advantages and identify attractive diversification opportunities that can leverage the productive know-how in place. To make the best of the available information (which is limited, especially for services), we do this separately for goods and services. In any case, following a sector identification process that largely builds on the economic complexity methodology, a total of 63 products and 18 services industries are identified across the intensive and extensive margins. These, in turn, are grouped in ten preliminary diversification themes, five for goods and five for services. Each of these themes shows promise through growing global demand for that industry and / or UAE’s demonstrated capabilities in the industry. The themes include the following:

Section	Themes
Services	ICT
	Financial Services
	Business Services
	Healthcare
	Creative Industries
Goods	Food
	Metals
	Chemicals
	Plastics
	Machinery

Looking ahead, policymakers should engage in an iterative and dynamic process – involving a variety of stakeholders (policymakers, academia, industry experts, civil society, etc.) – to validate these results. As stressed before, this exercise is meant to serve as an initial contribution to advancing such a process by rigorously identifying key opportunities for export growth and, therefore, should not be interpreted as a final product. These dialogues and analyses should also be used to acquire a better understanding of the sectors that appear as attractive diversification opportunities in terms of their granularity and specificity, to refine even further the assessment of which specific activities within each of them are feasible and attractive for the UAE. Likewise, they could be a relevant opportunity to identify the potential policy/industrial challenges to the development of the themes.

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Annex 1: Estimating Employment by Activity in the UAE

Comprehensive and detailed firm-level data is crucial for understanding the complexity and diversity of an economy, and for formulating policy recommendations that can support economic growth and development. The Growth Lab had access to various datasets, which provided varying levels of insights on the economic structure of the UAE:

1. Value-added by broad economic sector.
2. Export data
3. National Economic Registry (NER)

The rest of this annex outlines the process of creating a dataset that specifies our best estimations of industry employment in the UAE, which included various steps, merging different datasets and making several corrections to the data.

NER Pre-Processing

1. The NER data consists of 9 datasets that come from 34 different economic registries in the UAE²⁵.
2. All 9 datasets were merged into a unique database, keeping a unique observation per establishment and a unique column for each description and activity code, while also adding fields that include if there is a foreign owner, presence in a free zone, a standardized identifier for all establishments, and whether the parent/holding company is inside a free zone.
3. Given the lack of a standardized classification system across all the emirates, a Natural Language Processing (NLP) algorithm was used to match different classification systems to the International Standardized Industrial Codes (ISIC) Rev.4.
4. After the NLP provides the better matches for each individual code, a process of manual review of the match was undertaken to improve the accuracy of the concordances between ISIC and the rest of the classification systems.
5. An important share of establishments had missing dates of registration in Abu Dhabi, Sharjah, Fujairah, Dibba, and Ajman. To correct this, the registries were ordered using their businesses ID numbers provided by their respective authorities (which were mostly chronologically ordered) and all missing dates were interpolated within the dataset.
6. The NER firms were then matched to North American Industrial Classification System (NAICS) in their 2017 version with 6-digit codes. Given that the ISIC Rev. 4 to NAICS 2017 concordance is one to many for several codes, an NLP model

²⁵ Files include a dataset for each of these registries: Dubai, Abu Dhabi, Fujairah Municipality, Dibba Municipality, Umm Al-Quwain, Ras Al Khaimah, Sharjah, Ajman, and one for each of 26 of the UAE's free zones.

that utilized NER firms' descriptions assigned the most relevant NAICS code for each firm constraining the process to only the possible ISIC to NAICS matches.

NER Corrections

Once the dataset was merged, we did a sense-check to identify any critical issues that could be skewing the database from properly reflecting the economic capabilities of each individual Emirate. Then, appropriate steps were taken to limit the impact of the potential biases that the data generation processes have on the dataset²⁶.

To distinguish the active firms as of 2022, we dropped those observations with registration dates after December 31st, 2022, and kept those observation that had their 'Business License Status' set as "Current". It is not entirely straightforward, given the current nature of the dataset, to get a sense of the landscape at an earlier time. One method would be the filter the data to drop the firms that were registered after year 't' and to then keep the observations that have "Active" status as of 2023.

Firm Employment Figures

The NER does not have data on the employment of firms. Hence, we used data from ORBIS to add employment numbers. The establishment size of the ORBIS data for the UAE is 382,416, which is only 47% of the NER data. Out of these 382,416 firms in ORBIS, 8% matched to the firm names in NER using a matching process that compares the similarity a pair of strings²⁷. When the process could not find an acceptable match for the firm name, a process of manual matching and comparison was used to guarantee the precision of the match (if the match existed).

When an employment figure was not available in the ORBIS, the number of employees was imputed into the data using information from the US Census Bureau. The information from the SUSB Annual Dataset by Establishment Industry (2019) contains information on employment, wages, and number of establishments per 6-digit NAICS code that can be merged into the processed NER dataset. Given that ORBIS data with employment reported is concentrated in firms with more than 500 employees, the average size of employment per establishment was taken from the less than <500 employees range defined in the data.

²⁶ Between 2018 to 2022, there was an increase in the number of new registrations in Dubai Department of Economy and Tourism, under the ISIC code 7020. A closer check revealed that most firms reported a description of "Project management services". Many of these firms had the identical address of "Bur Dubai Al Fahedy" and more than 13,000 observations were dropped from the final dataset.

²⁷ For this purpose, a Jaccard matching method was utilized and a threshold of 0.08 to accept a match as correct was defined.

The average size of private sector establishments in the UAE differs from that of the US, according to MoHRE data. To adjust employment data, 2019 employment shares from Abu Dhabi, Dubai and the UAE were applied to the broad economic sectors that they are reported. Abu Dhabi's shares were only used for Abu Dhabi; Dubai's shares were used for Dubai, Ajman, and Sharjah since they are part of the same metropolitan area, and UAE shares were used for the emirates of Ras Al-Khaimah; and Umm Al Quwain. The total employment estimations for the dataset in the UAE as whole were calculated using MoHRE private sector employment for 2022 and the shares of the private and public sector employment reported by the FCSC in 2019.

Table 1: Re-scaling Factors for Employment per Industry per Emirate (2022)

Sector	Dubai	Abu Dhabi	Sharjah	Ajman	Ras Al Khaimah	Fujairah	Umm Al-Quwain
Agriculture	1	70	1	1	15	6	1
Mining	1	1	1	1	3	2	1
Utilities	4	6	15	3	5	5	2.5
Construction	1.7	0.35	1.7	1	0.45	0.45	1
Manufacturing	0.75	0.7	0.4	0.4	0.2	0.48	0.25
Wholesale & Ret.	0.2	0.25	0.25	0.25	0.1	0.15	0.4
Transport & Sto.	0.5	0.2	0.5	1.5	0.7	0.3	0.3
Information	0.75	1	1.6	2	0.5	2	1
Finance	0.25	0.2	2	4	0.25	0.5	1
Professional Serv.	0.4	0.7	0.8	0.6	0.2	1	0.33
Administrative Serv.	0.3	0.45	1	0.45	0.25	0.5	1
Real Estate	2	1.4	3	1.7	1	1	3
Education	1.5	5	1.5	1.4	1.4	2	2
Health	0.2	1.75	0.5	1.2	1	0.8	4
Accommodation	0.4	0.5	0.45	0.4	0.3	0.2	0.45
Arts	0.55	0.35	0.3	0.5	0.2	0.2	2
Other Services	0.2	0.2	0.2	0.2	0.2	0.1	0.25

Source: Statistical Agencies from each Emirate.

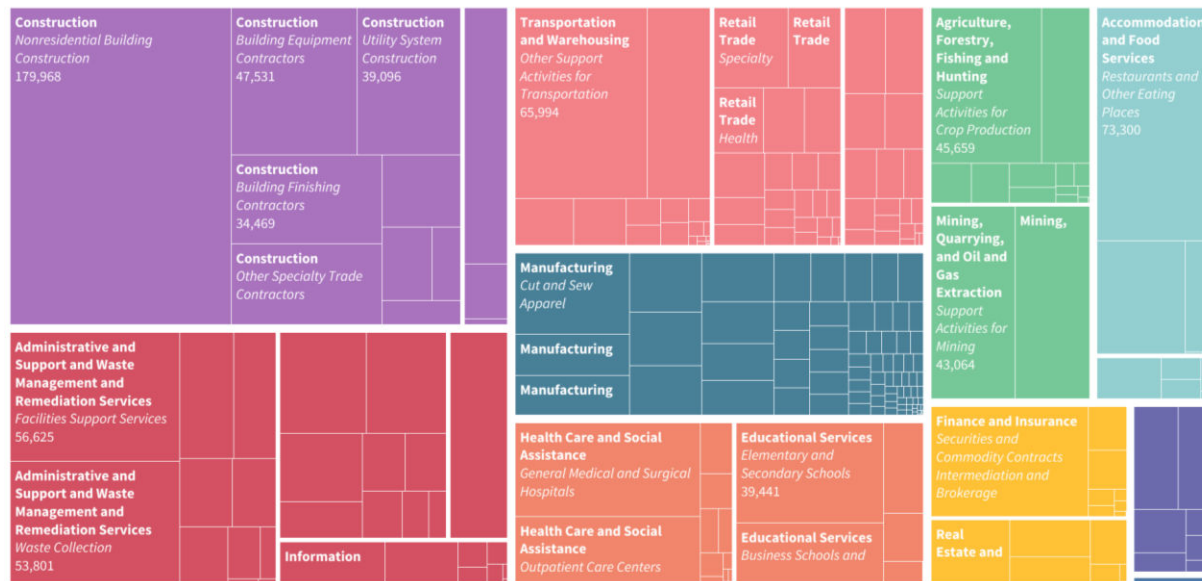
Coverage of the Processed Data

- Size of dataset: 1.084 million observations of firms registered between 1901 and 2022
- Out of those: 817,397 are current firms with an active status.
 - o 391,042 in Dubai
 - o 197,566 in Abu Dhabi
- Total employment in the UAE: 6.46 million
- Other variables available but not included in processed final data:
 - o Nationality of owners
 - o Initial capital
 - o License type

Annex 2: Estimated Employment by Activity – Abu Dhabi and Dubai

Abu Dhabi's Industrial Composition

Figure 75: Employees per Industry (2022) - Abu Dhabi



Source: National Economic Registry; own calculations

Abu Dhabi has a strong employment presence in several services sectors such as Construction and Real Estate, while it also comprises an important share of the manufacturing employment in the UAE. According to figures published by the Statistics Center of Abu Dhabi (SCAD), the emirate has the biggest importance in terms of economic activity (in terms of value-added) in the UAE, even when oil is excluded, both in manufacturing and in the services industries.

In Construction and Real Estate, Abu Dhabi's industries are concentrated in Non-Residential Construction, Support Services for Facilities and Waste Collection. All these industries are closely related and have been growing strongly in the last few years while currently take more than 16% of the total economic employment of the emirate.

Other strong industries in Abu Dhabi include Support Activities for Mining, Support Activities to Transportation and General Medical and Surgical Hospitals. Due to its strong oil sector, Abu Dhabi has been able to attract many foreign firms that provide support services to the oil and gas industry such as companies that provide maintenance for the wells, the drilling equipment or provide exploration services. In other industries, there has been active policies from the emirate's government to attract and develop these sectors around its ports, airports, and healthcare systems.

While in Abu Dhabi most of the economic activity happens in the mainland, the emirate has been able to create certain clusters around its Free Zones. Masdar City has been able to accommodate an important share of the free zone employment in Electricity Generation and Distribution due to its solar panel industry, while Abu Dhabi Global Market has been able to attract managing and holding offices for foreign companies.

Figure 76. Relative Comparative Advantage in Abu Dhabi vs. UAE (4-digit NAICS)



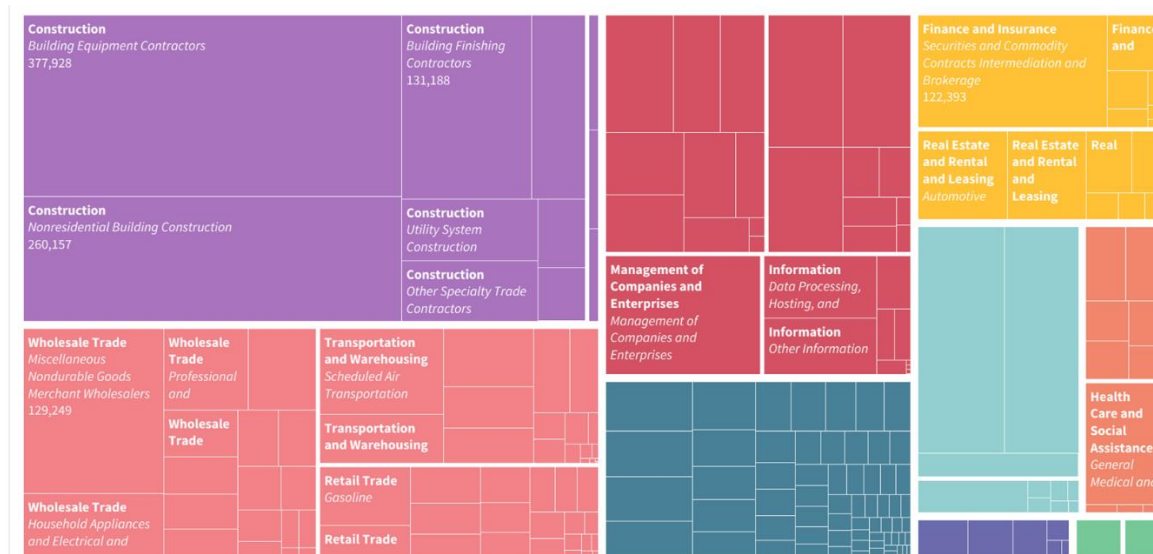
National Economic Registry; Own Calculations

Source: National Economic Registry; own calculations

Relative to the employment in the rest of the UAE, Abu Dhabi has a strong comparative advantage in Agricultural activities and activities related to its oil and gas sector. Due to its oil production and the high overall employment of the agricultural sector in Abu Dhabi, the emirate exhibits high RCAs in Oil and Gas Extraction, Support Activities for Mining, Vegetable and Melon Farming, Oilseed and Grain Farming, Sheep and Goat Farming and other related agricultural activities.

Dubai's Industrial Composition

Figure 77. Employees per Industry (2022) - Dubai



Source: National Economic Registry; own calculations

Dubai's employment is predominantly concentrated around Construction, Wholesale and Retail Trade and Transportation activities. As the largest emirate in terms of employment, Dubai has been able to attract and develop economic sectors both tradeable and non-tradeable. As in the case of Abu Dhabi, Dubai has developed a strong construction and real estate sector, which comprises around 25% of the total employment of the emirate (excluding Public Administration employees).

In the Construction industry, employment is mostly concentrated in two industries: Commercial and Institutional Building Construction and Plumbing, Heating and Air-Conditioning Contractors. While the growth in firms' creation has not been as strong as in Abu Dhabi, establishments have managed to grow in double-digit numbers since 2017. Other important construction companies include Building Equipment Contractors, Other Building Finishing Contractors, and Site Preparation Contractors.

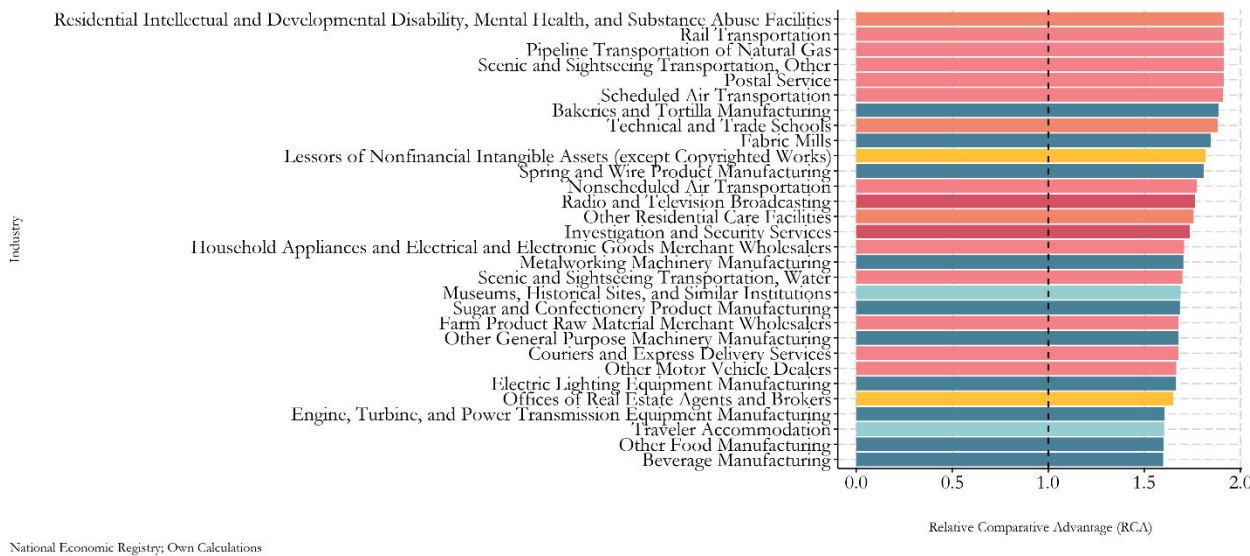
In the case of Wholesale Trade, there is a big concentration of re-exporters in the emirate mainly under the code 424990. While the big majority of all the firms are inside the mainland, employment is more evenly distributed across the Free Zones (30,239 employees) and the mainland (88,151 employees). Dubai also concentrates an important number of firms dedicated to the wholesale of Clothing, Electrical Equipment and Computer Equipment.

For the Transportation industry, Dubai has been able to concentrate an important cluster around its ports and airports. While most of its transport employment can be attributed to

Emirates, there are some other transportation activities, such as Marine Cargo Handling and General Freight Trucking. These three industries comprise 3.7% of the total employment in the emirate.

Free Zones are an important part of Dubai’s economy, although it does not concentrate the biggest part of its employment. The employment in the Free Zones is concentrated in three entities: Dubai International Financial Center (DIFC), Jabel Ali FreeZone (JAFZA) and Dubai Silicon Oasis (DSO). In DIFC, employment is mostly concentrated in Holding companies, wholesalers and managing offices; in JAFZA, it is concentrated in wholesalers, manufacturing companies and companies related to water transportation, while on DSO jobs are predominantly in different types of ICT consulting.

Figure 78. Relative Comparative Advantage in Dubai vs. UAE (4-digit NAICS)



Source: National Economic Registry; own calculations

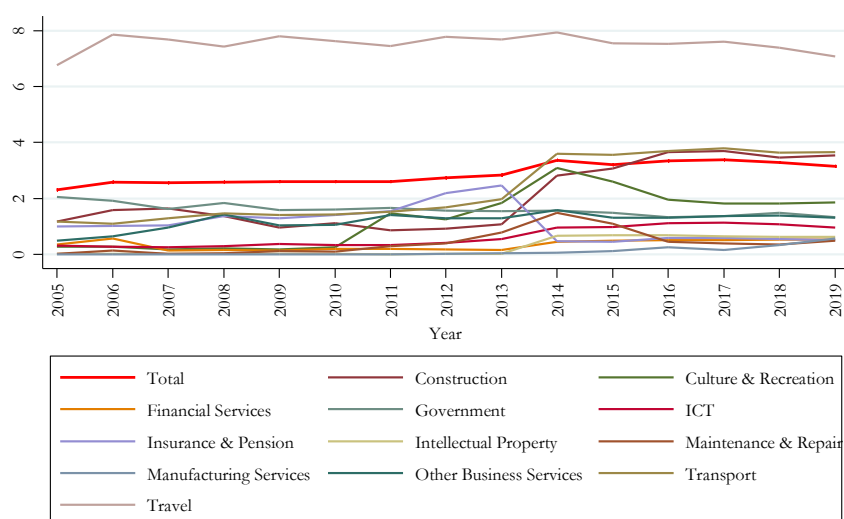
Dubai exhibits a relative strength compared to the UAE in activities related to transportation and manufacturing specially. Dubai’s port, airports and storage facilities gives the emirate an important advantage in several types of transportations such as Air Transportation, Rail Transportation and Pipeline Transportation of Natural Gas. Additionally, Dubai has a strong manufacturing sector for which it has a relative comparative advantage in Food Manufacturing, Wire Manufacturing and Electric Lighting Manufacturing.

Annex 3: Services Exports Market Share on Selected Markets

To better understand the evolution of UAE's market share and the opportunities that exist for it in services, it is useful to conduct specific analyzes for relevant markets. Market-level analysis is especially important for services exports, since trade tends to be more sensitive to the target market. Therefore, we now focus on analyzing UAE's market share for relevant regions or countries. In this line, it is worth reiterating that more than half of the country's service exports go to Asia, including the GCC and other nearby countries, and that an additional 30% goes to Europe. At a country level, the ones that concentrate most of UAE's exports are China, Great Britain, USA, India and Japan.

Because it is the most natural market for the UAE and already one of the most relevant in terms of the value of exports, we focus first on Western Asia (WA).²⁸ In line with the trend for the world as a whole, the UAE's participation in the region also increased during the period, moving from 2.30% in 2005 to 3.15% in 2019, as described in Figure 79.

Figure 79: WA Market Share by Service Sector (2005-2019) - UAE



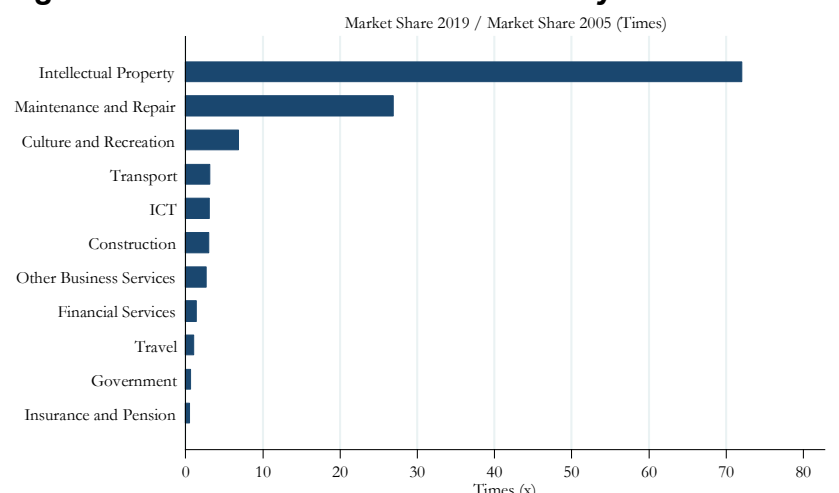
Source: Own calculations based on the World Trade Organization

In this context, as presented in Figure 81, the Manufacturing Services (not shown to allow better visualization), Intellectual Property, and Maintenance and Repair sectors were the ones that experienced the largest share increases. Beyond the above, the sectors in which the UAE stands out the most in terms of its participation are Travel, reaching a significant share of 7.07%, and, although at some distance, Transport and Construction, in which it exceeds 3.50%. To assess the room that the UAE has to grow in the region, it is convenient to calculate -for every sector- the relative positioning of the country and its

²⁸ Western Asia includes Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, and Yemen.

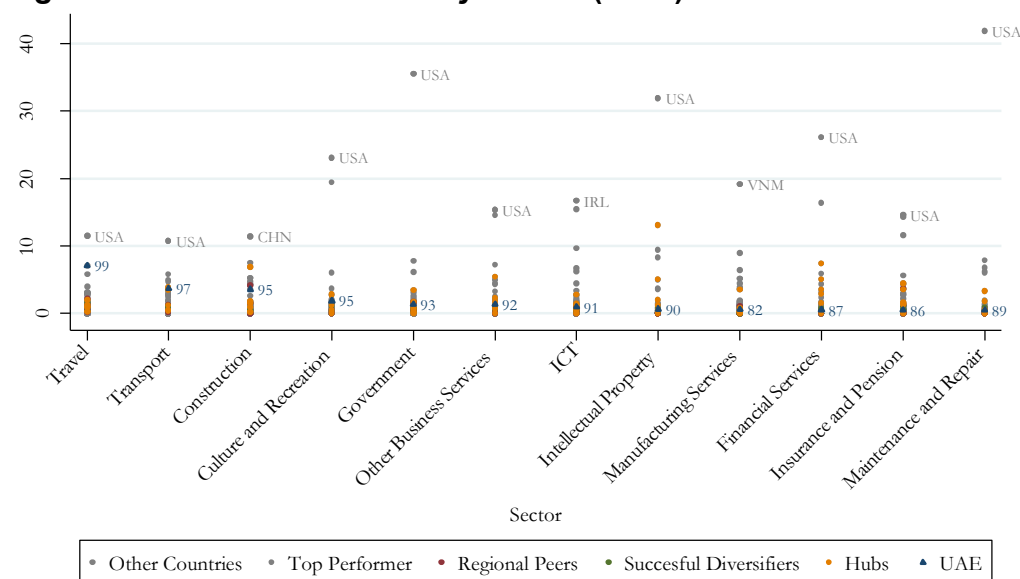
distance to the country with the largest market share (top performer). From Figure 82 it is possible to observe that in Travel, Transport and Construction, UAE's market share exceeds that of almost all its peers and is at a short distance from that of the country with the largest share, suggesting little room for growth. The opposite is observed, for example, in Financial Services, Intellectual Property, and Maintenance and Repair.

Figure 80: WA Market Share Increase by Service Sector (2005-2019) - UAE



Source: Own calculations based on the World Trade Organization

Figure 81: WA Market Share by Sector (2019) - All Countries



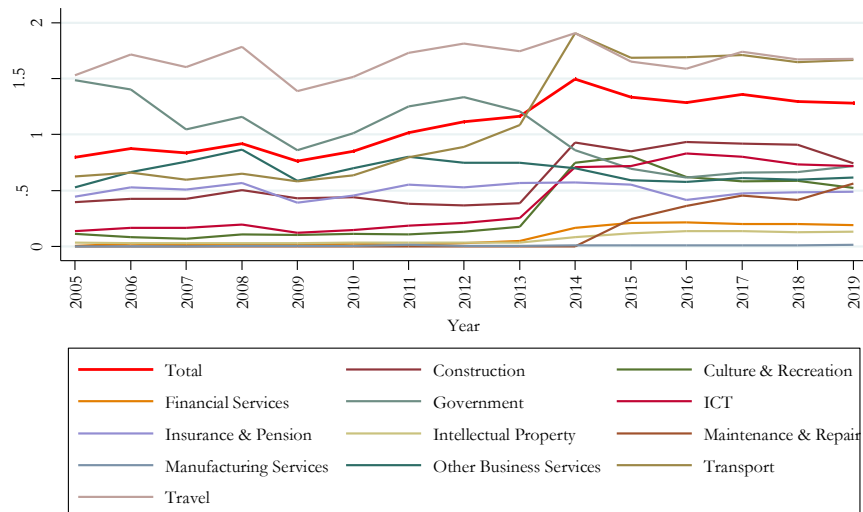
Note: UAE's label indicates its corresponding percentile for every sector

Source: Own calculations based on the World Trade Organization

The UAE's market share in China grew from 0.79% in 2005 to 1.28% in 2019. As of 2019, China is not only the largest service export market for the UAE, but also the fastest growing. UAE's market share in China has increased consistently increased between

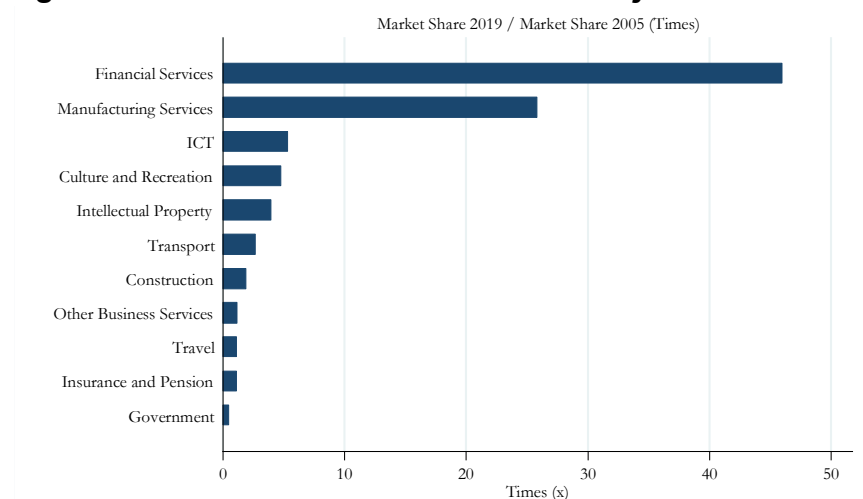
2005 and 2019 (Figure 83), mostly driven by Travel and Transport, the sectors in which the UAE shows the highest participation rates, but also by smaller ones that have experienced even larger share increases. Among these, Financial Services and Manufacturing Services stand out, as highlighted in Figure 84. Figure 85 shows that the UAE is well-positioned (percentile close to 90) in almost all services sectors, especially in Travel and Transport. However, relative to Western Asia, with a few small exceptions, the UAE ranks lower and is at a larger distance from the top performer.

Figure 82: China Market Share by Service Sector (2005-2019) - UAE



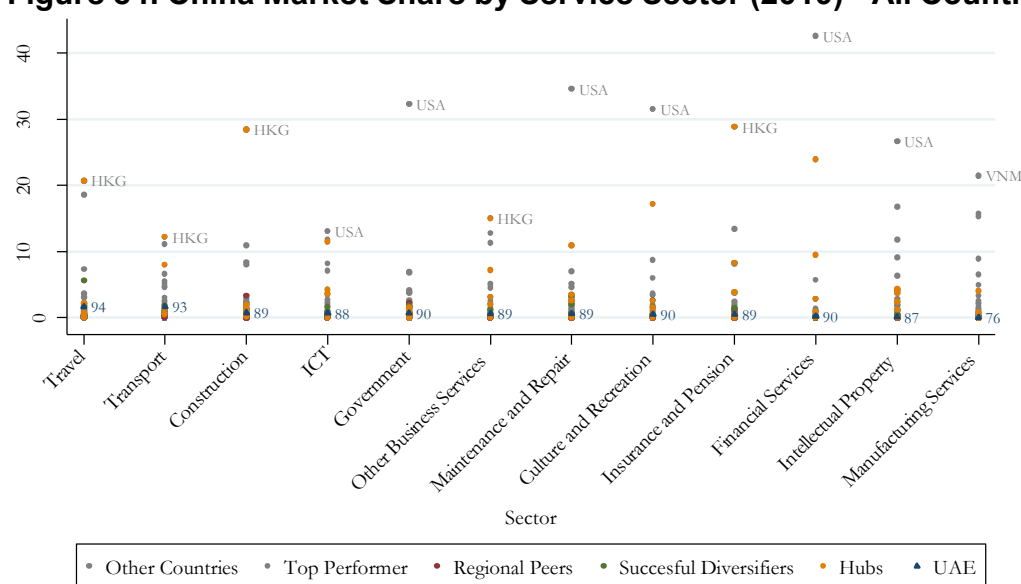
Source: Own calculations based on the World Trade Organization

Figure 83: China Market Share Increase by Service Sector (2005-2019) - UAE



Source: Own calculations based on the World Trade Organization

Figure 84: China Market Share by Service Sector (2019) - All Countries

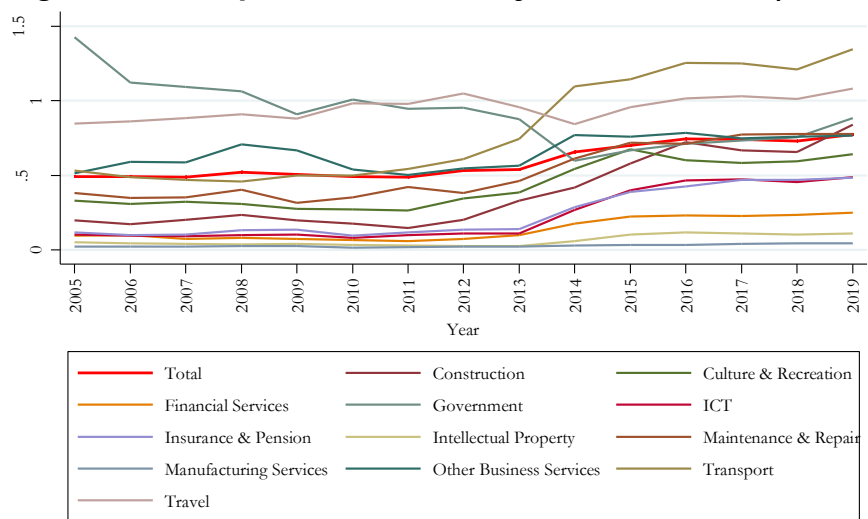


Note: UAE's label indicates its corresponding percentile for every sector

Source: Own calculations based on the World Trade Organization

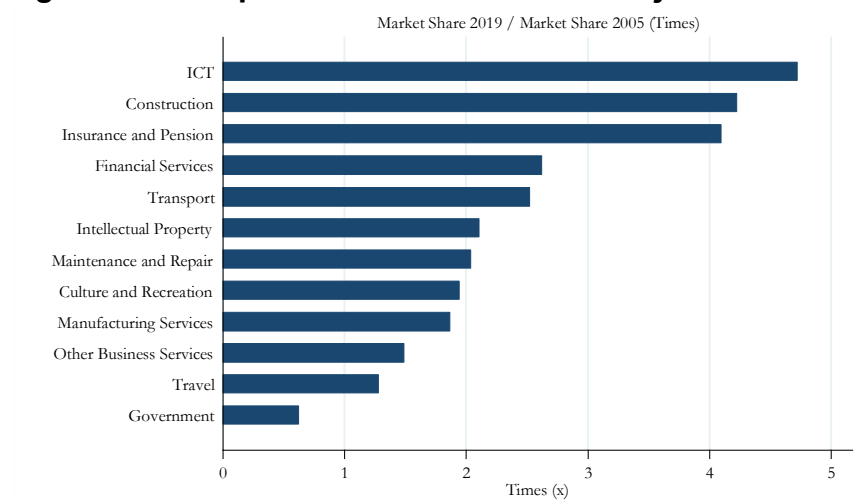
The UAE's market share in Europe grew from 0.49% in 2005 to 0.77% in 2019. As stated earlier, Europe constitutes one of the largest markets for the UAE, concentrating around 30% of total services exports, with the UK standing out with 7.2%. Largest market shares are given by Transport, Travel, Government and Construction (Figure 86), while largest share increases are given ICT, Construction and Insurance & Pension (Figure 87), these being the sectors in which the UAE has grown most rapidly in Europe in recent years. Relative to other countries, the UAE ranks high and is relatively close to top performers in the largest sectors (Transport and Travel). In sectors such as Financial Services, Business Services and ICT, not only the UAE is far from the top performer but there are many peers that present larger shares as well (Figure 88).

Figure 85: Europe Market Share by Service Sector (2005-2019) - UAE



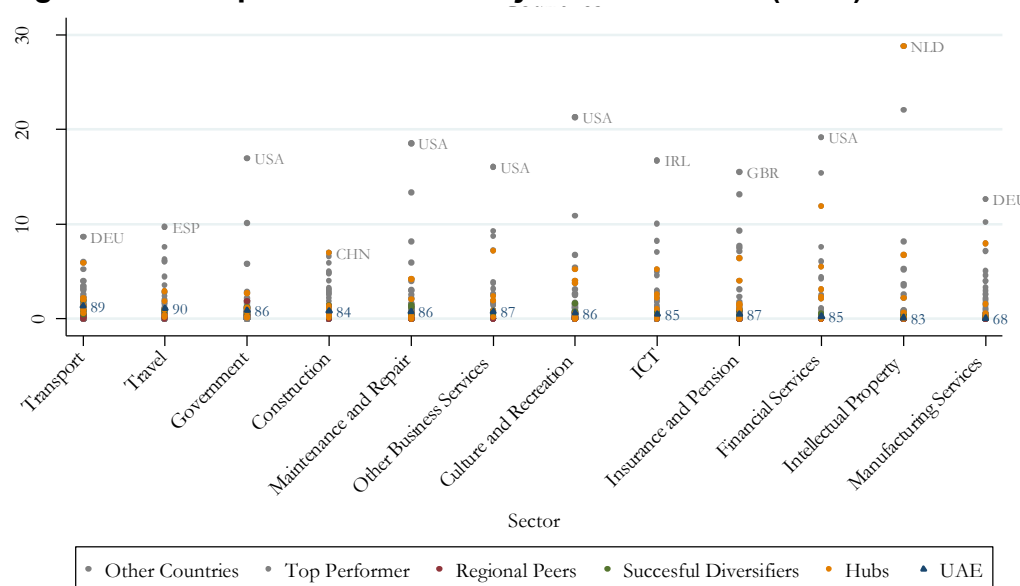
Source: Own calculations based on the World Trade Organization

Figure 86: Europe Market Share Increase by Service Sector (2005-2019) - UAE



Source: Own calculations based on the World Trade Organization

Figure 87: Europe Market Share by Service Sector (2019) - All Countries

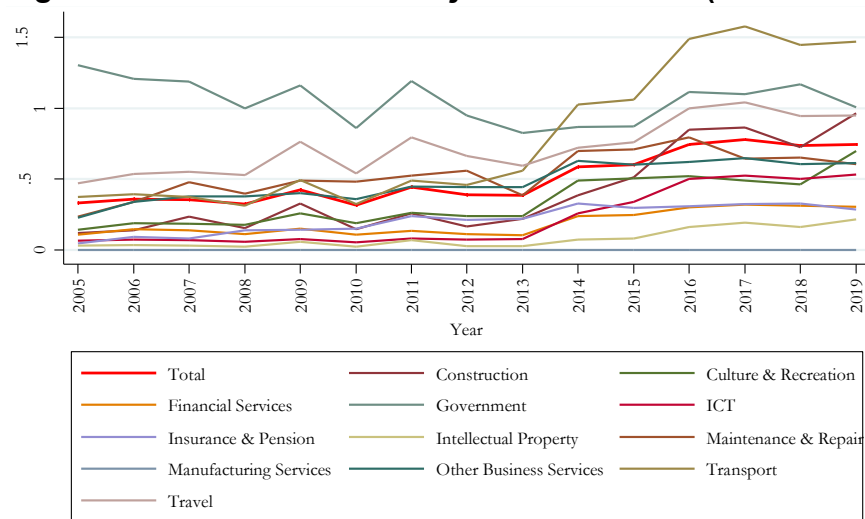


Note: UAE's label indicates its corresponding percentile for every sector

Source: Own calculations based on the World Trade Organization

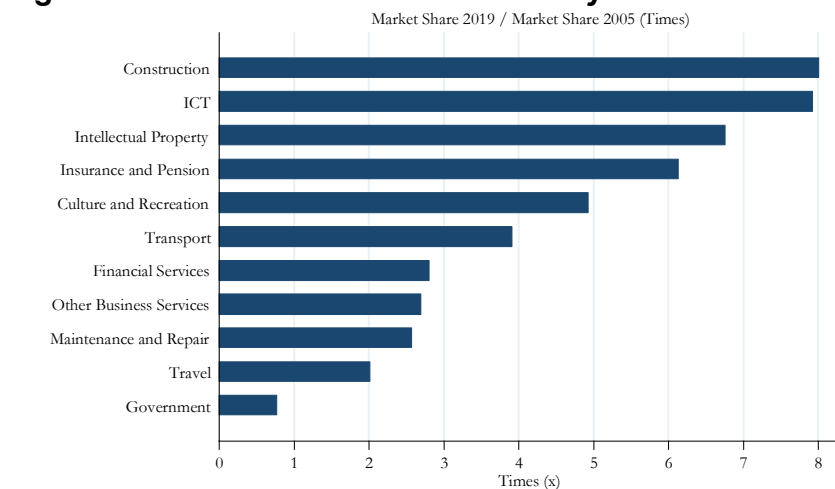
Finally, the UAE's market share in the US grew from 0.33% in 2005 to 0.74% in 2019. In terms of individual countries, the US is the third country that concentrates the most UAE's exports, very close behind China and the UK. UAE's services exports to the US have grown rapidly, with the country more than doubling its market share (Figure 89). At a sector level, Transport stands out, showing a participation of nearly 1.5%, more than doubling UAE's overall participation. Government, Construction and Travel also show relatively high market shares. On the other hand, largest share increases are given by Construction and ICT (Figure 90). Based on a relative analysis, there appears to be less room for growth in Transport than there is other large sector such as Construction and Travel (Figure 91). In sectors such as Financial Services and ICT, not only the UAE is far from the top performer but there are many peers that present larger shares as well.

Figure 88: US Market Share by Service Sector (2005-2019) - UAE



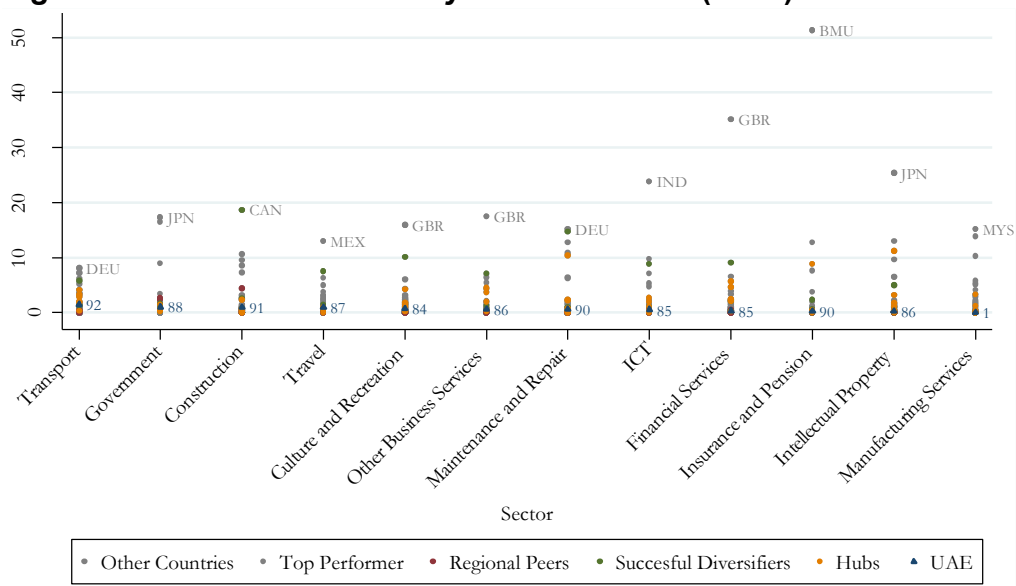
Source: Own calculations based on the World Trade Organization

Figure 89: US Market Share Increase by Service Sector (2005-2019) - UAE



Source: Own calculations based on the World Trade Organization

Figure 90: US Market Share by Service Sector (2019) – All Countries



Note: UAE's label indicates its corresponding percentile for every sector

Source: Own calculations based on the World Trade Organization

Annex 4: Use of Services Trade Data for Sector Identification

Methodological Adjustments

Despite presenting multiple advantages, the WTO data has an important downside: the high aggregation of the data. Specifically, exports are reported under 12 broad services categories:

1. Manufacturing services
2. Maintenance and repair services n.i.e.
3. Transport
4. Travel
5. Construction
6. Insurance and pension services
7. Financial services
8. Charges for the use of intellectual property n.i.e.
9. Telecommunications, computer, and information services
10. Other business services
11. Personal, cultural, and recreational services
12. Government goods and services n.i.e.

As an example, the “Other business services” category includes a wide range of services that include R&D services; professional and management consulting services; and technical, trade-related and other business services. This last sub-category, for instance, includes architectural, engineering, scientific, and other technical services; waste treatment and de-pollution, agricultural and mining services; operating leasing services; and trade-related services. For these more disaggregated categories (which are still quite aggregated), no exports data is provided, so it is not possible to estimate their relative ubiquity (and complexity), the proximity between each of them, or the UAE's production capabilities.

To provide a more detailed understanding of the most attractive development and diversification opportunities available for the UAE's services exports, we decide to use the US Bureau of Economic Analysis's (BEA) trade in services classification structure. The BEA provides 66 subcategories that nest under the 12 broad categories provided in the WTO data. Figure 92 describes the BEA classification structure. Here, for example, we are able to disaggregate “Other Business Services” into more granular descriptions such as “Legal Services”, “Architectural Services”, “Scientific and Technical Services”, etc. We then construct a crosswalk that maps each NAICS 4-digit code to a BEA service category, given that our firm registry data uses NAICS. The additional granularity offered by the BEA Services classification thus allows us to understand activities in the UAE at a more detailed level.

Figure 91: Structure of BEA Services Exports Data

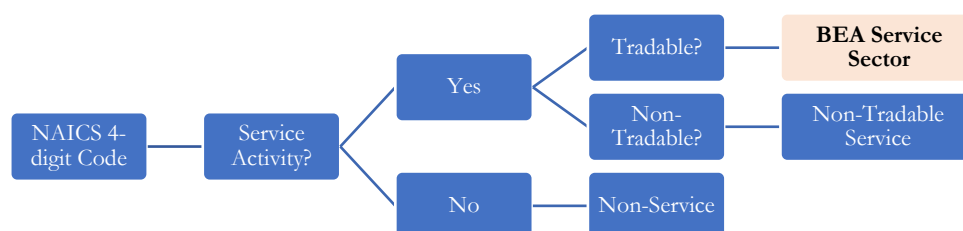


Source: BEA International Services Classification Structure. Note: The treemap is colored by broad BEA Sectors, sized by the count of more granular categories nested within each broad BEA sector.

NAICS to BEA Services Crosswalk & Definition of Tradable Services

In order to construct a crosswalk between each NAICS 4 digit code and BEA Sector, we first parse through the list to distinguish between services and non-services. Naturally, NAICS codes that are not services did not match to a BEA Sector. Examples of non-service activities include most agricultural farming activities, and oil and gas mining. NAICS codes that are indeed services activities are then pass through another filter: their tradability. If a NAICS code is an activity that is deemed a tradable service (see next paragraph for how we defined tradability), we then map it to the most granular matching BEA sector possible. Out of 311 4-digit NAICS codes, 99 codes are classified as tradable services, and therefore assigned to BEA Service Sectors. Wherever possible, we match each NAICS code to the most-granular level of BEA service sector. Figure 93 below outlines the process to produce the crosswalk.

Figure 92: Process Flow to Construct NAICS to BEA Crosswalk



Source: Own elaboration

The process of assessing tradability combined referenced measures and manual sense-checks. The first attribute that we consider is *export propensity*. This was a variable, computed using Dun & Bradstreet global employment data that captures the share of the world employment in the industry under establishments that self-report as exporters, for each NAICS 4-digit code. We use this percentage to understand the extent to which each activity code is tradable, especially for ambiguous cases. We also reference a *tradability* variable that was used in the construction of the Growth Lab's Metroverse, which outlines whether we expect industries to be traded between cities or not. This measure incorporates correlation between local employment for each industry, RCAs relative to the local region, use of local resources, and whether the industry was a public work. Then, we manually sense-check our final list to construct the final concordance.