Asia-Pacific Economic Cooperation

Advancing Free Trade
for Asia-Pacific **Prosperity**

International Seminar for the Development of the Natural Gas Market: Comprehensive Analysis of Results

Mexico City, Mexico | 16-17 October 2018

APEC Energy Working Group

May 2019

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Introduction

Natural gas has positioned worldwide as a flexible and competitive fuel, capable of being used for electricity generation, as an industrial input, as well as for vehicular and residential use, among others. Its environmental benefits are aligned with the objectives of reducing polluting emissions, placing it as a fuel through which the transition to renewable energy can be more agile and efficient.

The world supply of this fuel has increased due to the exploitation of unconventional resources in the North American region, thus allowing the development of a market that is widely attractive for its international trade. This condition translates in growing investments in pipeline infrastructure and LNG liquefaction, regasification and storage.

Although growth is expected both in the demand and in the trade of natural gas, the global panorama also shows relevant counterweights; the price of oil has fallen, limiting the interest in carrying out considerable investments required by the sector; the growing use of renewable energies reveals the intention of the world population to make use of truly clean energies; In the same way, the need for flexible sources of access to energy with affordable prices has increased. The above, highlights the need to open a discussion focused on the exploration of solutions, which allows an integration of various economies to achieve common objectives.

Undoubtedly, the integration of an economy with the world markets is a factor through which a country increases its competitive and absolute advantages; this integration allows expanding the possibilities of development by offering the domestic market a greater variety of goods and services, competitive prices and different qualities, among others, allowing the allocation of monetary resources and human capital to those activities for which it is more competitive.

Commercial and economic integration has become one of the main means by which economies are used to achieve a higher level of development based on commercial and capital exchange.

For this economic integration to be successful, it is necessary that, among other things, the participating economies maintain homogeneous economic, social and political conditions. Particularly in a global natural gas market, the main obstacles to be overcome are those that generate additional costs for market agents and hinder the free transit of goods from one region to another. Specifically for the economies that make up the Asia-Pacific Cooperation Forum (APEC), the great distances between its members and the great diversity of economic systems, cultures and customs, constitute factors capable of limiting access to new markets that are located beyond of the traditional producers and exporters of this fuel. For the capital market, financial, legal and regulatory stability is important to guarantee the security of investments through property rights conditions and ease of doing business in the entire hydrocarbon value chain.

The International Seminar for the Development of the Natural Gas Market (Seminar), held in October 2018 in Mexico City, was a platform aimed at achieving integration

among the different economies of the APEC region, and whose objective was to increase relations between members, through international trade and investment flows, obtain new knowledge and explore different ways to do business through the exchange of best practices. In this regard, the exhibitions, presentations and work tables held at the Seminar focused on determining the main factors through which the development of an international, robust and competitive natural gas market can be achieved.

With the dynamics carried out, it was possible to obtain considerable feedback, both from the economies and from the participants, reaching various conclusions that will be presented throughout this document. Among these conclusions, one of the most relevant was the acceptance of a lack of knowledge among the members of the region and the way in which these deficiencies have limited contact, cooperation and trade, particularly natural gas.

The present document has the purpose of diminishing such gaps, analyzing the possible opportunities of commercial relation between the economies and proposing interrelation measures that contribute with the strengthening of an international market of natural gas.

Objective

To increase knowledge and understanding of the APEC member economies, with a particular focus on natural gas; through a series of analyzes and evaluations, in order to reduce the uncertainty gap between them by increasing their level of understanding and compatibility, thereby facilitating an analysis of possible business opportunities and international cooperation.

Descriptive analysis of variables and economies

The APEC region is widely diverse, encompassing variable economies with considerable differences in terms of culture, ideology, trends and languages, just to name a few. These differences are observed in all aspects of their productive activity, including the natural gas sector. The region is characterized by having the largest producers of natural gas in the world, such as the United States of America (USA), Canada, Australia and Russia, as well as the largest importers in the world with People's Republic of China and Japan as the clearest cases. These conditions generate a complex context for collaboration and the exchange of goods and, at the same time, can be seen as a platform for international cooperation. Although, for natural gas, there are basic conditions for constant exchange, there are also obstacles generating uncertainty such as financial, risk, technological and regulatory factors and even adverse market factors.

The following graph shows that the economies of the region can be characterized generally as producers with the exception of some cases such as Japan, Republic of Korea, Chinese Taipei and Singapore. Within the consumer economies, People's Republic of China, USA, Russia, Japan, Mexico, Republic of Korea, among others are highlighted.

Graph 1 – Natural Gas Balance
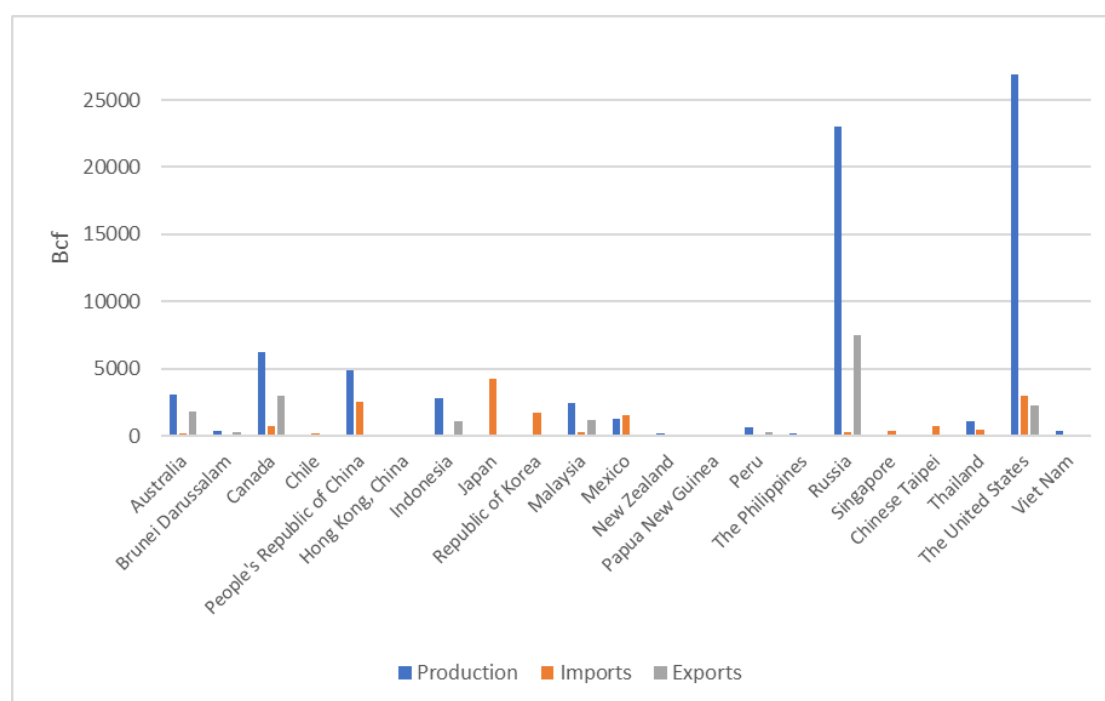
Source: Own elaboration with data from the International Energy Agency (IEA)

The data show the importance of natural gas as the primary source of energy for electricity generation. In the case of final consumption, People's Republic of China, the USA and Canada stand out mainly because of their use in the industrial sector.

Graph 2 – Natural Gas Consumption
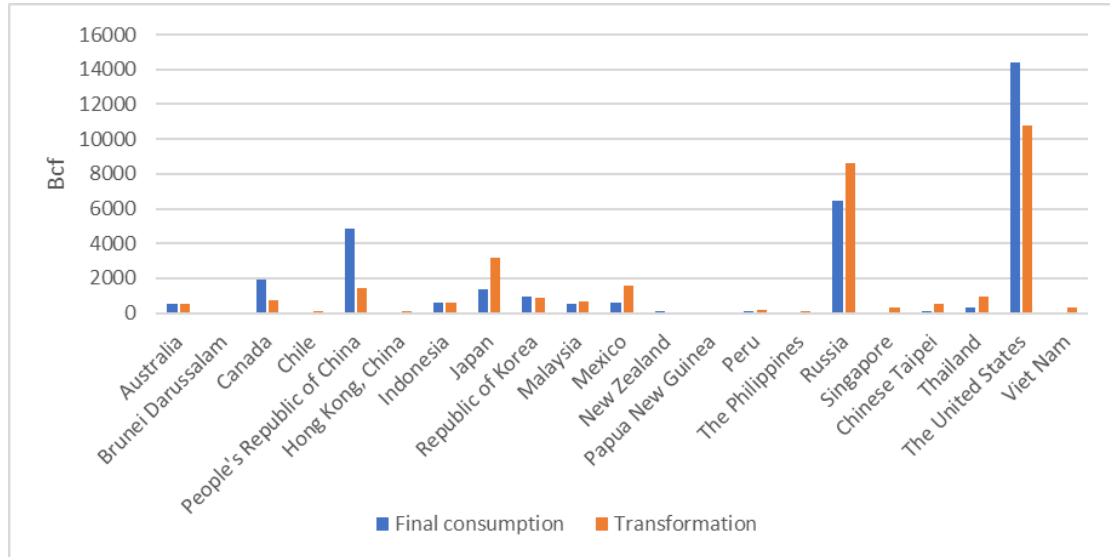
Source: Own elaboration with data from the International Energy Agency (IEA)

As can be seen from the previous graphs, there is a very large variation in the productive capacity of economies such as Russia, the USA, People's Republic of China and Australia with the rest of the members. Until today, these differences between consumer and producer economies have been the main engine for the commercialization of natural gas.

In addition to the commercial opportunities in the region, the capacity and productive profile of natural gas also determine the degree of investment in the sector and, therefore, influence the development of LNG transport, import and export infrastructure. The differentiated development and relative homogeneity of the region, together with the relative stability of its variables and financial indicators, enhance opportunities to increase foreign investment.

Graph 3 – Net Foreign investment
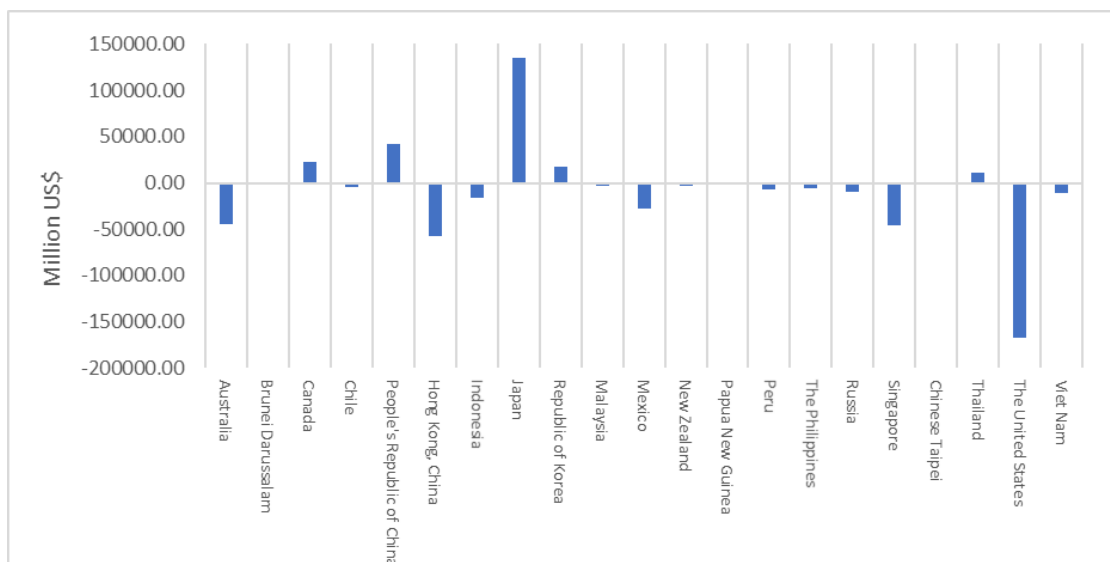
Source: Own elaboration with data from the World Bank

In accordance with the World Bank, there are several indexes that show the ease of doing business in specific sectors, and that should be considered in the evaluation of possible investment decisions in new markets. These variables include: investor protection levels, land use management index, corporate transparency index and conflict of interest regulation index. The higher the value of the index, the greater the attribute for the investor.

The APEC region presents a certain homogeneity in the aforementioned indexes, which show an average of 7 out of 10 with a standard deviation of 1.56 to 2 for the indicators of conflict of interest and transparency; an average of 6 and deviation of 1 for the investor protection index; and an average of 20 and a deviation of 6 for the land use management indicator, on a scale of 1 to 30. Special mention must be made of economies such as Singapore, Canada, Hong Kong, China and New Zealand for their high levels of investment protection and ease to make use of land in productive projects. Likewise, Canada, Hong Kong, China, Malaysia, New Zealand and Singapore in conflict of interest regulation; Finally, for the corporate transparency indicator, Australia, People's Republic of China, Republic of Korea, Hong Kong, China and Chinese Taipei stand out.

Graph 4 – Strength of investor protection index
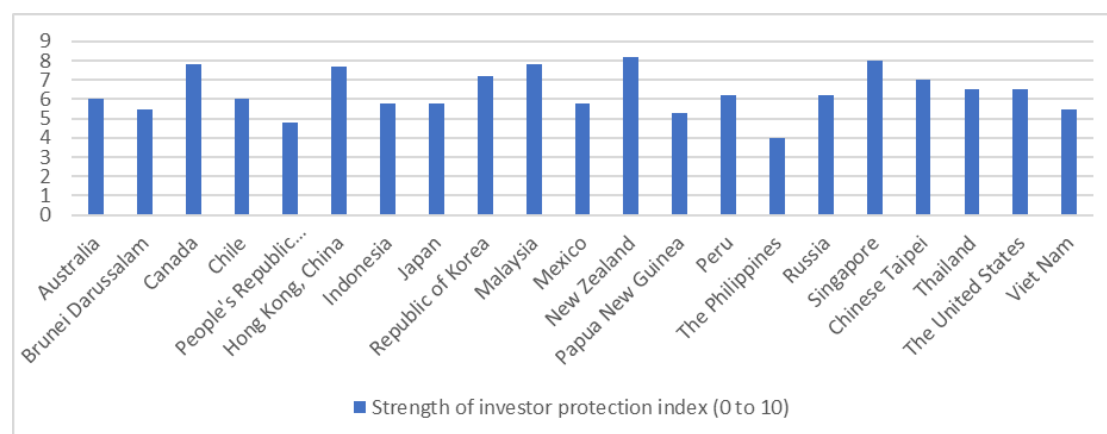
This indicator is based on securities regulations, company laws and court rules of evidence. Source: Own elaboration with data from the World Bank.

Graph 5 – Quality of the land administration index
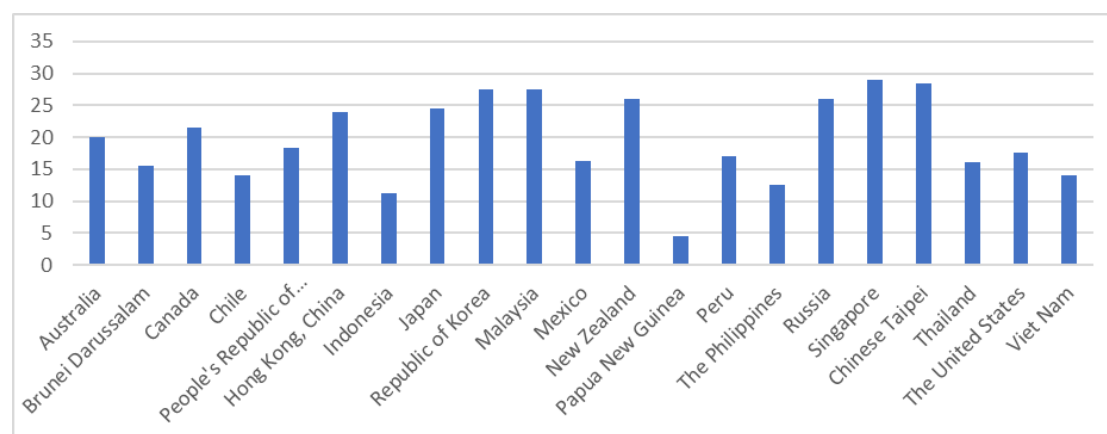
This indicator is composed of five signals: the reliability of infrastructure, transparency of information, geographic coverage, land dispute resolution, equal access to property rights. Source: Own elaboration with data from the World Bank.

Graph 6 - Extent of conflict of interest regulation index
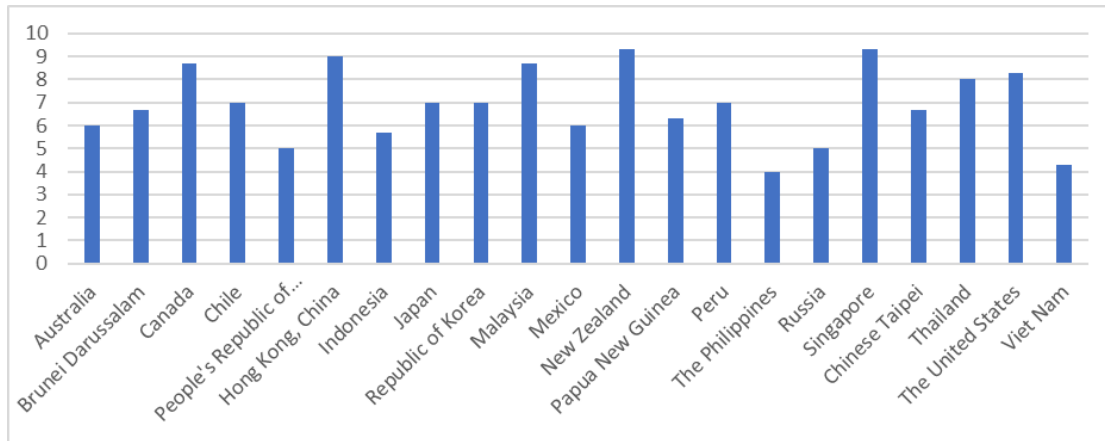
The indicator measures the protection of shareholders against directors' misuse of corporate assets for personal gain. Source: Own elaboration with data from the World Bank.

Graph 7 - Extent of corporate transparency index
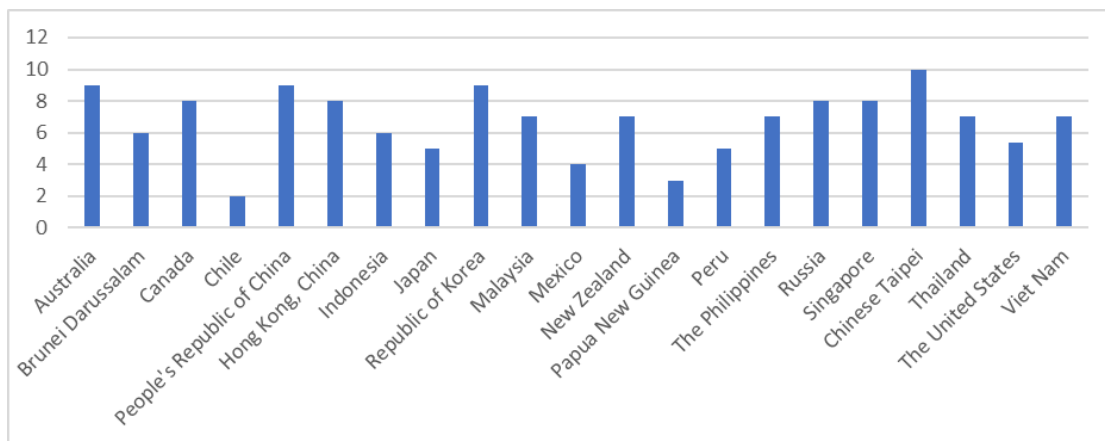
This indicator shows the corporate transparency on ownership stakes, compensation, audits and financial prospects. Source: Own elaboration with data from the World Bank.

It is important to consider that in order to materialize the foreign trade activities of hydrocarbons, several crucial elements are required; such as LNG liquefaction, regasification and storage facilities, likewise, it is necessary to consider the reception and shipping capacity of both the exporter and the importer, as well as the infrastructure required within the receiving economy (pipelines, ports, tanks, etc.). These variables directly affect the efficiency of international trade and the costs required to make transactions effective, so they directly impact the interest of potential foreign investment.

In this regard, the economies that present the highest costs to foreign trade are Australia, People's Republic of China, Russia and Papua New Guinea. While Canada, the USA and the Republic of Korea show the lowest costs per container.

Graph 8 - Cost of Trade
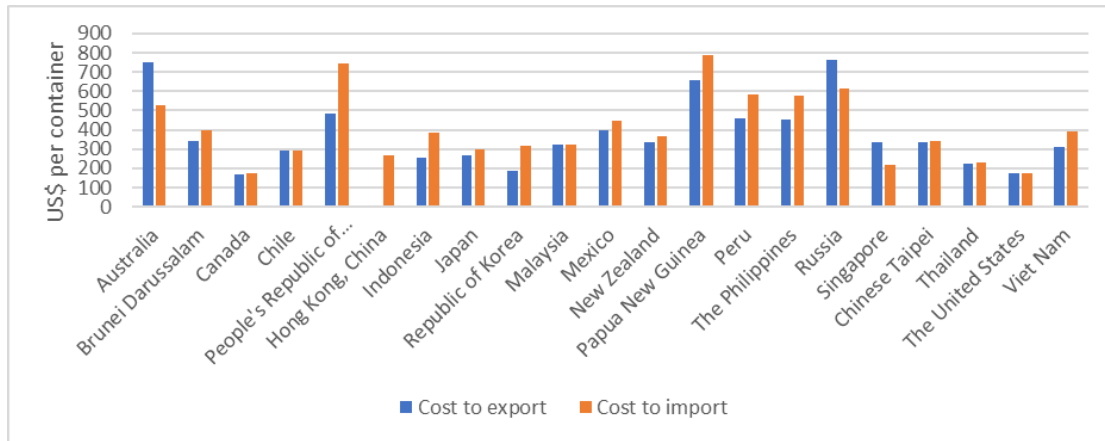
Source: Own elaboration with data from the World Bank.

1) Methodology

From the descriptive analysis carried out, as well as from the conclusions obtained in the Seminar, it is possible to determine that the APEC region is both homogeneous and complementary, where financial stability exists and where commercial exchange has promoted competitive advantages in each economy. There are economies specialized in the production of natural gas and consumers with complementary consumption needs. However, international trade flows are concentrated in a handful of economies, squandering a commercial potential that represents opportunities for investment, cooperation and development.

In order to explore the commercial and financial compatibility of the economies of the region, a hierarchical cluster analysis was conducted to help us group the APEC economies, according to their degree of similarity or dissimilarity to identify potential relationships commercial, investment and cooperation in the natural gas sector among them and thus take advantage of the areas of opportunity to benefit the region, through the creation of an attractive market.

The hierarchical cluster analysis is an exploratory tool of data that helps to evaluate the relationships between objects and variables, being able to observe more clearly their similarities and dissimilarities, which allows to form groups or clusters based on the individual elements analyzed. For this exercise, the SPSS statistical program was used to perform the desired analysis, as well as the exploration of the data through descriptive statistics.

For the aforementioned analysis, the *Closest Neighbor* methodology was used for the variables from which greater homogeneity is desirable for the market and the *Furthest Neighbor* methodology for the variables that distinguish between producing, exporting and importing economies. The variables used were chosen in order to form a series of groups of determinants for international trade in natural gas (Barbe and Riker, 2015), namely: costs, market size, risk and regulations. For the above, the most representative variables were chosen for each of these and grouped as indicated below:

Determinant:
- Risk
- Market size

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- Costs of commerce
- Infrastructure
- Ease of doing business

Determinants	Indexes
Risk	Tax, Interest Rate, Inflation, Exchange Rate (%)
Market size	Imports, exports and production (Bcf)
Costs of commerce	Export and import cost (US$ per container)
Infrastructure	# of liquefaction and regasification facilities, km of transmission pipelines. (Km)
Ease of doing business	Index of extent of corporate transparency, conflict of interest regulation, land administration and strength of investor protection.

Having the most recent indicators of the economies of the APEC region and forming the groups of variables described above, 7 hierarchical cluster analyzes were carried out using the standardized Euclidean distance methodology, taking care at all times to group variables with similar units and independent of each other to avoid problems of bias in the results.

Through the described method and based on the similarities between economies, according to the aforementioned determinants, the software produced a series of clusters among them, showing possible bilateral relationships and, therefore, potential business opportunities.

Following are the clustering histories of the previous analysis, it is worth mentioning that the software showed the results with the economies arranged alphabetically, so 1 refers to Australia and 21 to Viet Nam. The number of stages varies, since each test is independent because it depends on the degree of similarity in how many stages the economies are conglomerated.

Size of the Market

Stage	Combined Cluster		Coefficients	First appearance of the stage cluster		Next stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	12	15	1,604,833	0	0	3
2	4	6	3,638,441	0	0	3
3	4	12	46,392,920	2	1	8
4	2	14	47,227,977	0	0	6
5	17	18	97,509,420	0	0	10
6	2	21	98,952,831	4	0	8
7	7	10	198,622,201	0	0	9
8	2	4	436,245,002	6	3	10
9	1	7	834,682,797	0	7	14
10	2	17	880,136,737	8	5	11
11	2	19	1,318,497,110	10	0	13
12	9	11	2,746,227,273	0	0	13
13	2	9	4,706,626,443	11	12	16
14	1	5	12,207,328,846	9	0	15
15	1	3	17,642,155,425	14	0	18
16	2	8	18,346,775,336	13	0	18
17	16	20	49,052,550,102	0	0	19
18	1	2	58,834,884,689	15	16	19
19	1	16	734,415,855,279	18	17	0

Infrastructure

Stage	Combined cluster		Coefficients	First appearance of the stage cluster		Next stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	2	21	901,000	0	0	5
2	6	13	5,185,000	0	0	3
3	6	15	9,613,000	2	0	4
4	6	18	10,409,000	3	0	5
5	2	6	13,929,000	1	4	9
6	4	17	57,601,000	0	0	11
7	9	12	80,692,000	0	0	10
8	10	19	250,002,000	0	0	14
9	2	14	331,777,000	5	0	10
10	2	9	476,137,000	9	7	11
11	2	4	672,401,000	10	6	12
12	2	8	804,260,000	11	0	14
13	3	5	1,690,257,000	0	0	18
14	2	10	2,086,657,000	12	8	16
15	7	11	18,352,665,000	0	0	16
16	2	7	28,111,209,000	14	15	17
17	1	2	441,588,269,000	0	16	18
18	1	3	1,296,000,065,000	17	13	19
19	1	16	10,691,560,196,000	18	0	20
20	1	20	98,062,872,541,006	19	0	0

Doing Business

Stage	Combined cluster		Coefficients	First appearance of the stage cluster		Next stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	9	18	2,130	0	0	12
2	14	20	2,300	0	0	3
3	11	14	2,650	0	2	6
4	10	12	2,770	0	0	5
5	10	17	3,650	4	0	10
6	2	11	3,830	0	3	7
7	2	19	3,940	6	0	15
8	15	21	4,590	0	0	14
9	1	5	5,330	0	0	17
10	6	10	5,340	0	5	11
11	3	6	6,350	0	10	12
12	3	9	7,250	11	1	13
13	3	16	8,250	12	0	17
14	7	15	8,570	0	8	15
15	2	7	9,010	7	14	16
16	2	4	10,330	15	0	19
17	1	3	13,780	9	13	18
18	1	8	15,410	17	0	19
19	1	2	20,220	18	16	20
20	1	13	55,850	19	0	0

Costs

Stage	Combined cluster		Coefficients	First appearance of the stage cluster		Next stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	14	15	25,000	0	0	16
2	3	20	73,000	0	0	10
3	10	18	557,000	0	0	5
4	4	8	714,651	0	0	8
5	10	12	733,000	3	0	6
6	2	10	793,000	0	5	7
7	2	21	970,000	6	0	8
8	2	4	1,922,000	7	4	9
9	2	7	3,146,450	8	0	11
10	3	19	5,668,000	2	0	11
11	2	3	6,138,051	9	10	12
12	2	11	6,625,000	11	0	13
13	2	9	6,633,649	12	0	14
14	2	17	6,925,000	13	0	16
15	1	16	8,812,250	0	0	20
16	2	14	20,036,000	14	1	17
17	2	5	26,824,810	16	0	18
18	2	13	32,965,808	17	0	19
19	2	6	36,626,000	18	0	20
20	1	2	40,781,250	15	19	0

Risk

Stage	Combined cluster		Coefficients	First appearance of the stage cluster		Next stage
	Cluster 1	Cluster 2		Cluster 1	Cluster 2	
1	2	17	,286	0	0	12
2	1	12	,297	0	0	8
3	5	10	,311	0	0	4
4	5	6	,471	3	0	6
5	11	21	,668	0	0	14
6	5	15	,888	4	0	8
7	9	19	,898	0	0	9
8	1	5	,964	2	6	10
9	9	20	1,063	7	0	10
10	1	9	1,178	8	9	11
11	1	3	1,229	10	0	12
12	1	2	1,566	11	1	13
13	1	4	1,707	12	0	14
14	1	11	2,288	13	5	15
15	1	8	2,427	14	0	16
16	1	7	2,713	15	0	17
17	1	16	3,763	16	0	18
18	1	13	4,186	17	0	19
19	1	14	5,789	18	0	0

2) Results

The cluster analysis of the economies of the APEC region conglomerated several groups of compatible economies. Below are the results of the exploratory analysis for each determining factor.

Market size
In this cluster, economies with complementary markets are grouped, that is, producing and exporting economies will be grouped with importers.

Cluster	Economies
1	Australia
2	Brunei Darussalam; Chile; Hong Kong, China; Japan; Republic of Korea; Malaysia; New Zealand; Peru; The Philippines; Singapore; Chinese Taipei; Thailand; Viet Nam
3	Canada; People´s Republic of China
4	Indonesia; Mexico
5	Russia
6	The USA

Infrastructure
In this cluster, economies are grouped with similar natural gas infrastructure, which would allow commercial transactions or that could present opportunities in the creation of infrastructure.

Cluster	Economies
1	Australia
2	Brunei Darussalam; Chile; Hong Kong, China; Japan; Republic of Korea; Malaysia; New Zealand; Peru; The Philippines; Singapore; Chinese Taipei; Thailand; Viet Nam
3	Canada; People´s Republic of China
4	Indonesia; Mexico
5	Russia
6	The USA

Trade Costs
This cluster groups economies with similar trade costs.

Cluster	Economies
1	Australia and People´s Republic of China
2	Brunei Darussalam; Indonesia; Mexico; Peru; The Philippines; Thailand; ; United States; Viet Nam
3	Canada; Hong Kong, China; Republic of Korea; Malaysia; New Zealand, Russia; Singapore; Chinese Taipei
4	Chile
5	Japan
6	Papua New Guinea

<u>Risk</u>
This cluster groups economies with similar financial risk levels.

Cluster	Economies
1	Australia; Brunei Darussalam; Canada; Chile; People´s Republic of China; Hong Kong, China; Republic of Korea; Malaysia; Mexico; New Zealand; The Philippines; Singapore; Chinese Taipei; Thailand; The United States; Viet Nam
2	Indonesia
3	Japan
4	Papua New Guinea
5	Peru
6	Russia

The previous clusters do not indicate how strong is the relationship between one economy and another, but calculate the compatibility of these. The conformations, as a result of the analysis, show a group of homogenous economies in general, with economies that stand out for their production capacity, infrastructure and in minor cases, for important differences in the financial risk indicators.

The market and infrastructure clusters are closely linked and since these can be correlated, their analysis was done separately. This analysis shows the close relationship between the size of the market and the profile of the economy with the necessary infrastructure for transport and trade.

Also, it is observed that although a large cluster was formed that groups most of the economies according to the size of the market, it is also clear that the members with greater productive capacity are in separate clusters due to the great difference of this indicator with the rest of the economies. Empirically, this situation also indicates that under this criterion, these economies are compatible with any other due to their export capacity.

The clusters formed for the determinants of costs and ease of doing business, show greater diversity because of the regulations and infrastructure of each economy. The above reflects the internal regulatory differences that result in greater difficulty in achieving commercial integration in the region. This indicator is especially important and interesting derived from the main conclusions observed in the seminar, where the discussion gave great importance to internal regulation, market opening, transparency and above all to the rule of law. These factors largely determine the development of infrastructure through private investment and, if deficient, make it difficult for projects to materialize.

Finally, the analysis that reflects the financial risk to which investors are exposed, indicates a stable and homogeneous financial sector for the economies of the region, the values of interest rate, inflation and exchange rate show a high degree of integration that grants certainty and facilitates the investment decision. There are some exceptions that are not strictly compatible with other economies because their indicators are different than the average, nevertheless these economies have additional attractions to promote investment and bilateral trade with member economies.

As mentioned above, the clusters formed initially do not indicate the degree of compatibility of the economies. Due to the above, a History of Conglomeration was made, which indicates the degree of similarity or dissimilarity of the objects according to the stage of conglomeration in which an element is joined to a determined group,

where the first stages indicate a high degree of compatibility and, on the contrary, the latter a minor degree. In this sense, a value was given to each of the conglomeration stages, where a higher value corresponds to the first stages and a lower value to the latter. This categorization yielded the following results, presented as a matrix, where the values were added for each set of variables, to obtain a general index of compatibility for the economies of the APEC region.

Economy	AUS	BD	CDA	CHL	PRC	HKC	INA	JPN	ROK	MAS	MEX	NZ	PNG	PE	PH	RUS	SGP	CTi	THA	USA	VN
AUS	-																				
BD	0.34	-																			
CDA	0.28	0.16	-																		
CHL	0.26	0.41	0	-																	
PRC	0.37	0.04	0.08	0	-																
HKC	0.08	0.18	0.17	0.19	0.17	-															
INA	0.19	0.23	0	0	0	0.13	-														
JPN	0.29	0.14	0	0.17	0	0	0	-													
ROK	0.11	0.27	0.2	0	0	0.17	0	0	-												
MAS	0.19	0.22	0	0.26	0.18	0.11	0.14	0	0	-											
MEX	0.27	0.24	0	0	0	0	0.06	0.16	0.09	0	-										
NZ	0.32	0	0	0.18	0	0	0	0	0.14	0.33	0	-									
PNG	0.04	0.03	0	0.15	0	0.19	0	0	0	0.15	0	0	-								
PE	0.02	0.34	0	0.16	0	0	0	0	0	0.19	0.18	0	0	-							
PH	0.01	0	0	0	0.15	0.18	0.07	0	0	0	0	0.2	0.2	0.2	-						
RUS	0.23	0	0.08	0	0	0	0	0	0	0	0	0	0	0	0	-					
SGP	0	0.52	0	0.17	0	0	0	0.12	0	0.16	0	0	0	0	0	0	-				
CT	0.07	0	0	0	0	0.17	0	0	0.2	0.18	0.17	0	0	0	0	0	0.16	-			
THA	0	0.24	0.11	0.13	0	0	0	0	0.14	0.32	0	0	0	0	0	0	0	0	-		
USA	0.01	0	0.37	0	0	0	0	0.11	0.12	0	0.16	0	0	0.19	0	0.04	0	0	0	-	
VN	0	0.49	0	0.14	0	0.09	0	0	0	0	0	0	0	0	0.13	0	0	0	0	0	-

This matrix considers the mentioned variables and indicates the degree of compatibility according to the grouping methodology. In this context, we can observe a large number of crosses with a value of zero that indicates low levels of compatibility in the information, and that were obtained from the cluster analysis with the methodologies of Nearest Neighbor and Furthest Neighbor. Although the value of zero may suggest that bilateral relations are not desirable, this value rather highlights the different qualities of each economy, so that the analysis of non-zero values is more revealing, since they indicate compatibility between the elements. The higher the value of the crosses, the greater the general compatibility between the economies. Next, a brief description of the most relevant results will be given:

3) Summary for economy

Australia

A high compatibility with **People's Republic of China, New Zealand, Russia and Japan** is observed. These values show Australia's current trade flows of natural gas to its main buyers, Japan and People's Republic of China, also establish a compatibility with New Zealand, which could be due to similar economic and financial conditions. Australia shows some degree of compatibility with most member economies, which confirms it as one of the world's leading producers.

Brunei Darussalam
It shows a high degree of compatibility with most economies except for New Zealand, the Philippines, Russia, Chinese Taipei and the USA. It highlights the potential relationship with Chile, Peru, Singapore and Viet Nam. While Chile and Singapore are characterized as importing economies and therefore have the infrastructure required for commercial activity, Viet Nam and Peru have conditions to do desirable business. There is a high potential for diversification of Brunei Darussalam in the region, which represents benefits in terms of innovation and investment, as well as new commercial routes.

Canada
Canada in its role as producer is compatible with various economies, its highest value is with the USA as a producer and exporter, as well as the economic and financial conditions of these. For its part, a cooperative and investment relationship with Australia is potentially productive.

Chile
It highlights its relationship with Brunei Darussalam, Australia, Malaysia and Singapore in its role as importer, as well as for its financial stability.

People's Republic of China
People's Republic of China's trade relationship with Australia stands out from the rest. Additionally, due to financial variables and business ease indicators, the compatibility of new businesses is limited. However, the capital of this economy is constantly expanding, which is attributed to factors that surpass this exploratory analysis.

Hong Kong, China
Hong Kong, China is positioned as an attractive economy for investment and with ample possibilities to expand capital to the economies of the region, mainly due to its nature as a financial center. Chile, Papua Nueva Guinea and Brunei Darussalam are among the economies with which it is most compatible.

Indonesia
As an exporting economy, Indonesia presents trade opportunities with Mexico and Hong Kong, China. On the other hand, the investor protection indicator is beneficial with economies such as Malaysia and Australia.

Japan
For the Japanese case, the most obvious relationship lies with Australia, one of its main partners in natural gas, on the other hand it shows great potential with Mexico, Singapore and the United States, mainly for ease of doing business and financial stability.

Republic of Korea
Its compatibility as an importing economy, as well as its financial conditions are with the USA, Brunei and Chinese Taipei.

Malaysia
Highlight the value calculated with Chile as an importing economy. On the other hand, it is compatible with New Zealand and Thailand in terms of foreign trade costs.

Mexico
According to the exercise, Australia, Brunei Darussalam and Chinese Taipei have the right conditions to diversify natural gas imports, and the stability conditions of these economies represent an investment opportunity between them. On the other hand, the close commercial relationship between the USA and Peru as a gas importing economy is reaffirmed.

Nueva Zealand
Australia, Malaysia and Thailand represent an opportunity in the region in terms of investments to a large

extent due to the low penetration of this hydrocarbon in this economy.

Papua Nueva Guinea
It has generally low levels of compatibility with the exception of **Hong Kong, China and the Philippines** in terms of investment.

Peru
Peru as a producing economy has considerable potential with **Brunei Darussalam and Mexico** with whom it has a long-standing commercial relationship. On the other hand, the **Philippines and the USA** are the economies with the most similar conditions for investors.

Philippines
Highlights a potential relationship with **Papua New Guinea, New Zealand and Peru** for similar and suitable conditions for investors.

Russia
The case of Russia stands out because of a low compatibility in general with the economies of the region, this being due to the fact that its main market is the European, with very advantageous market conditions, which gives a better opportunity cost. The results indicate a financial compatibility and in terms of investments with **Australia and the USA**.

Singapore
Singapore has a low value for most economies except **Brunei Darussalam** because of the size of its markets.

Chinese Taipei
There are no similarities to highlight except with **Republic of Korea** in terms of ease of doing business.

Thailand
There is a strong relationship **with Brunei and Malaysia**, due to their similarities in terms of costs and average indicators in terms of ease of doing business.

United States of America
The case of the United States, being a producer and exporter, could well be compatible with all the importing and investment-receiving economies, however, we see special compatibility with **Canada, Japan, Mexico and Peru**. In the case of Mexico and Canada, the relationship is very clear since it is the first, the main destination of natural gas produced in this economy and one of the main investment paths; Canada, for its part, maintains close ties in the natural gas trade as one of its main exporters. The case of Peru obeys the facilities of the South American country for investors. On the other hand, it would be well worth turning to see the Japanese and Asian market when some of the liquefaction projects on the west coast of the United States materialize, which could allow an increase in the bilateral and regional relationship.

Viet Nam
As it is marked by the current trend, as well as the natural gas profile of this economy, Viet Nam showed low results in comparison to the rest of the economies, the most significant relationship is presented with **Brunei Darussalam** in terms of costs and relationship with investors.

4) Conclusions

The work carried out within the International Seminar for the development of the natural gas market, led to highly relevant conclusions. Both the information from the participating economies and the discussions carried out in the form of round tables and panels of experts highlighted the importance of internal regulation and property rights to promote investment. Transparency was another of the determining factors as a means to grant certainty to investors, for which a clear organization and effective means of communication with the market are indispensable to ensure robust and lasting relationships.

Advances in gas transport technology and techniques have impacted the costs of foreign trade, in addition new regasification and liquefaction technologies allow the development of new flexible facilities with lower unit costs, which will result in a lower price of the molecule. Innovation does not only occur in physical facilities; it also rapidly advances in the way of doing business. Contracts have evolved from rigid, long-term contracts to flexible contracts based on the spot market.

These conditions materialized in the cluster analysis for the economies of the APEC region, where an attempt was made to determine the most desirable commercial and productive relationships according to a series of variables within which the previous conclusions are included.

The initial descriptive analysis showed a diverse, although homogeneous, region where the conditions for cooperation and exchange are evident but which, due to a general lack of knowledge of the region, is not always well taken advantage of.

The cluster analysis showed the main trade relations that are currently observed, Australia-Japan, Australia-People's Republic of China, Canada-United States, United States-Mexico, Mexico-Peru, among others. Likewise, it presented high levels of compatibility among non-conventional members to whom attention must be paid.

For its part, Brunei Darussalam presented high levels of similarities with the vast majority of the economies analyzed, this due to its role as a small producer and exporter, also because of its significant financial stability as it is within economies with medium facilities for investors, becoming an attractive economy for the regional market.

Hong Kong, China was one of the economies with the greatest potential in the region in terms of investments, confirming its role as a global financial center.

Economies such as Malaysia, Mexico and Thailand are positioned as some of the most attractive economies in the region, while Viet Nam showed little compatibility in general, derived from the current conditions of the natural gas and financial market in that economy, however, it presents important opportunities with specific members like Brunei Darussalam. Russia and the United States maintain their status as capital producing and exporting economies, although these economies are potential partners for the entire region, factors such as geographic or market orientation of their commercial integration with other markets or with specific partners.

Opportunities in the APEC region are vast, with diverse economies that complement each other, as well as important similarities in investment and opportunities for investors. With the results shown, the importance of internal regulation and of

governmental efforts to offer conditions of commercial and financial stability is observed, the development of natural gas infrastructure is closely linked with these investment flows and with it the opportunity of the internal growth of this market. The region's efforts should focus on increasing knowledge among member economies, as well as the exchange of strategies and best practices in regulatory and policy matters to promote the movement of capital to the natural gas industry within the region, thus promoting the development of new markets.

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