



UNIVERSITY OF GOTHENBURG  
SCHOOL OF BUSINESS, ECONOMICS AND LAW

# Structural Transformation in the Agricultural Sector

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Diversity in exports of Moquegua, Peru

Bachelor thesis in Development Economics (**15 credits**)

Department of Economics **Spring 2014**

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## **Acknowledgements**

We express our sincerest gratitude to Oscar Guzman that with his passion for development in Peru served as a great source of inspiration throughout the project.

The authorities of Moquegua deserve recognition for providing the necessary data and we especially thank José Sarolli for introducing us to them.

Lastly, we are thankful to the Swedish International Development Agency for granting us the Minor Field Studies scholarship and to our supervisor Professor Dick Durevall for his adequate and valuable feedback.

## Abstract

Economic development does not mean producing more of the same; instead, according to Rickardo Hausmann and his colleagues, it means to diversify and to produce more sophisticated goods. This thesis analyzes how this can be done in the non-traditional agricultural sector of Peru. Export data is obtained from the region of Moquegua and used to trace the development of the sector. The finding is that the exports of the non-traditional agricultural goods increase in diversity mainly because of larger production in the fishing industry. The diversification of exports may help Moquegua and Peru to be less dependent on the mining industry and to structurally transform the economy. This is important since the current exports generate few jobs and leave the country vulnerable to shifts in world prices for minerals.

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## 1. Introduction

Peru is currently experiencing an unprecedented time of economic growth which is a result of an increase in exports. These exports are mostly made up by minerals and gas which, like other natural resources, tend to be both a blessing and a curse for a country. Should the exports of minerals and gas fall it could lead Peru into an economic crises; a scenario which occurred in the past. Moreover, the existing export basket is capital intensive and thus generates few jobs. It can therefore be argued that the country needs to export new goods to have sustainable growth.

Rickardo Hausmann and his colleagues maintain that what separates rich countries from poor are that the latter produce fewer and less sophisticated goods. In the light of this, the exports of Peru need to become more diverse and sophisticated. This process should be done step by step and be based on possessed capabilities. Peru has the possibility to achieve this in the non-traditional agricultural sector which consists of fishing and agricultural goods. The definition of non-traditional agricultural goods is: “goods traditionally produced for domestic consumption but now exported”.

The purpose of this thesis is to identify the development of the non-traditional agricultural export in the region of Moquegua, Peru. More specifically, the research question is: Has the diversity of the non-traditional agricultural export increased? The research question is addressed by using data of the exports from this sector. The development of it is put under spotlight to see if and why the export diversifies.

The findings show both an increase and a decrease of diversity in the non-traditional agricultural sector. The fishing sector diversifies while the agricultural sector does not. An attempt is then made to explain the causes behind these findings where it is found that some of the development can possibly be explained due to market increasing market prices and market characteristics.

Next section introduces the theoretical framework and explains the concepts diversity, product space and the industrial policies connected to this area. The theory is followed by the background that describes the issues of the Peruvian export, Moquegua and the agricultural sector

and industrial policies. The approach then presents how to answer the research question. Next, the results analyze the development of the non-traditional agricultural sector. Finally the theory, background and results are put together in a conclusion of the findings.

## **2. Theoretical Framework**

### **2.1 What You Export Matters**

An enormous income gap is today found in the world between poor and rich countries (Hausmann & Hidalgo 2011, p.2). The result is varying living standards which may be illustrated by what countries export. Poor countries produce simple goods while rich countries produce simple goods and sophisticated goods. On this notion poorer countries need to diversify and produce more sophisticated goods, a process called *structural transformation* (Hausmann & Klinger 2006).

Countries are what they export (Hausmann, Whang & Rodrik 2005). As displayed in Figure 1, there is a positive relationship between GDP per capita (see x axis) and how sophisticated the exports are which is an indicator to how much income they generate (see y axis). This is measured by EXPY<sup>1</sup>.

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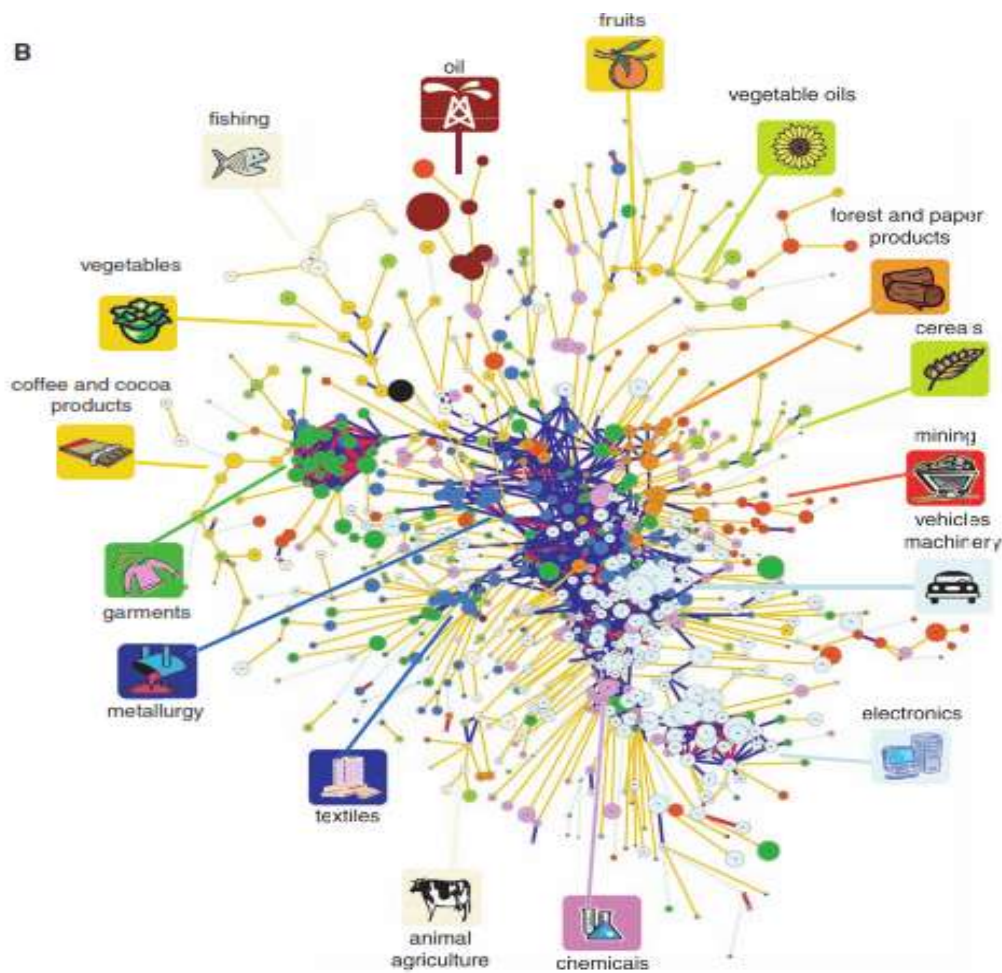
<sup>1</sup> See appendix for EXPY



different approach. Countries should, instead of producing more of one good, diversify and find new more sophisticated goods by using the capabilities possessed by the country (Shaw 2010). This process however, going from a simple to more advanced production, cannot happen over a night. For example, a country that produces mainly shoes does not have the means to produce computers. As previously mentioned, diversifying needs to be based on what the country already knows. Having this stated, how does a country diversify?

To answer the question knowledge is needed about the basics of how the goods in an economy are connected to each other. For this purpose the concept *product space* has been developed (Hausmann & Klinger 2006). Figure 2 identifies the goods produced in a country and goods it can move to. The model does not account for services in an economy.

**Figure 2: The Product Space**



Source: Barábasi, Hausmann, Hildago & Klinger 2007



The product space can be explained with the following metaphor: Think of the product space as a forest. In the forest there are trees representing goods and monkeys representing firms. The monkeys live from the trees and may jump from one tree to another. When this happens, it means that a firm starts producing a new type of good and that the country diversifies. However, making the jump may be more or less difficult depending on where the monkeys live. In poor countries the monkeys live in the peripheral parts of the forest where it is far between the trees, while in rich countries the monkeys live in the dense parts where they can make the jumps easily. Figure 2 illustrates this where vehicles are found in the dense parts and has many other goods nearby. Oil or mining on the other hand are not well connected to the rest of the forest, making it difficult to jump from here. The reason behind this is that the capabilities used to acquire oil cannot be used to produce as many other goods whereas the capabilities needed to produce vehicles more easily can be redeployed to fit other goods.

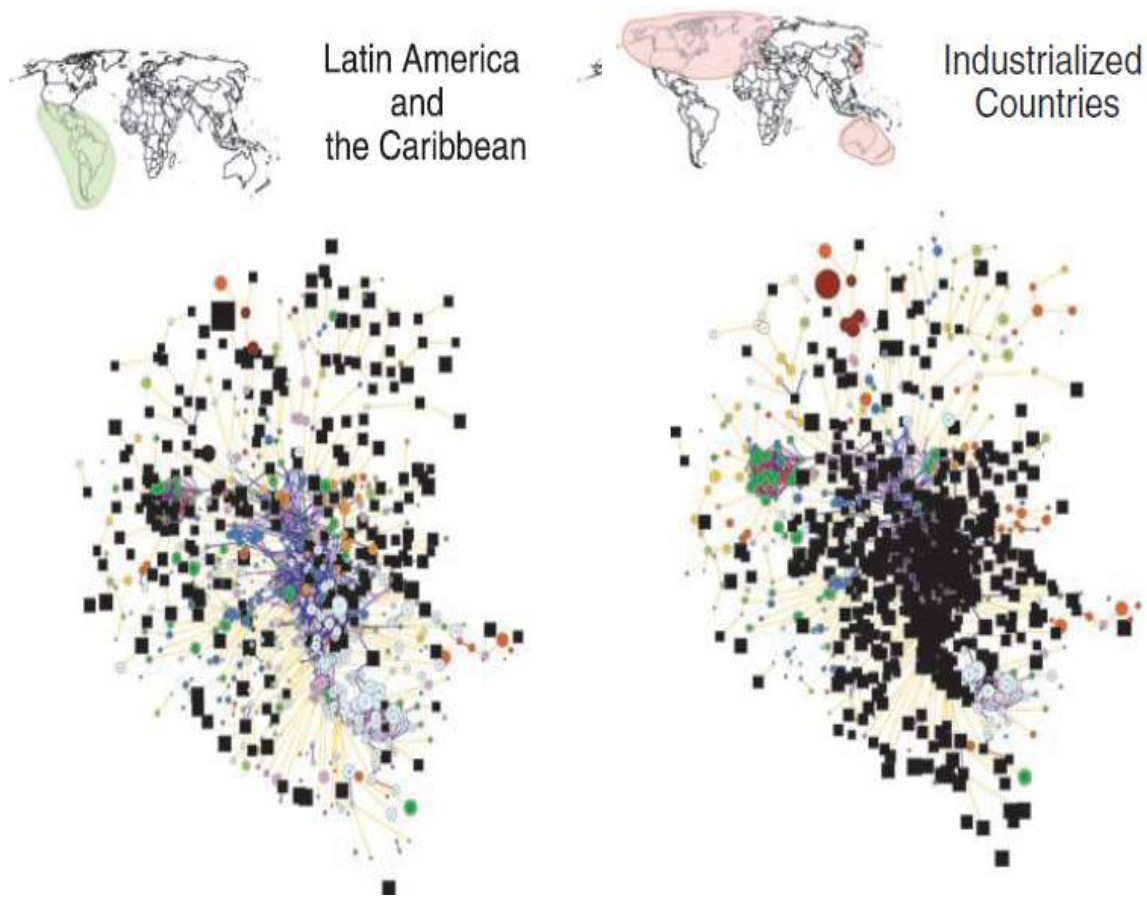
When jumping to a new good, i.e. to diversify, it means that capabilities are either reorganized or created. The newly created capabilities may have a spillover effect so that other industries can use them (Hausmann & Klinger 2006). A well trained labor force or a new railway system may be used by other industries than the intended one. Creating and reorganizing capabilities like these need policies designed to support the acquirement of needed capabilities (Hausmann, Rodrik & Sabel 2008).

Figure 3 shows how the product space is different between poorer and richer countries. The black squares indicate where the country has a Revealed Comparative Advantage<sup>2</sup> or put differently what the country exports. Notice how the product space of Latin American countries is found in the periphery, where it is more difficult to jump to new goods, in contrast to the industrialized countries (Barábasi et al 2007).

### **Figure 3: A Product Space Comparison**

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<sup>2</sup> See appendix for RCA



Source: Barábasi et al 2007

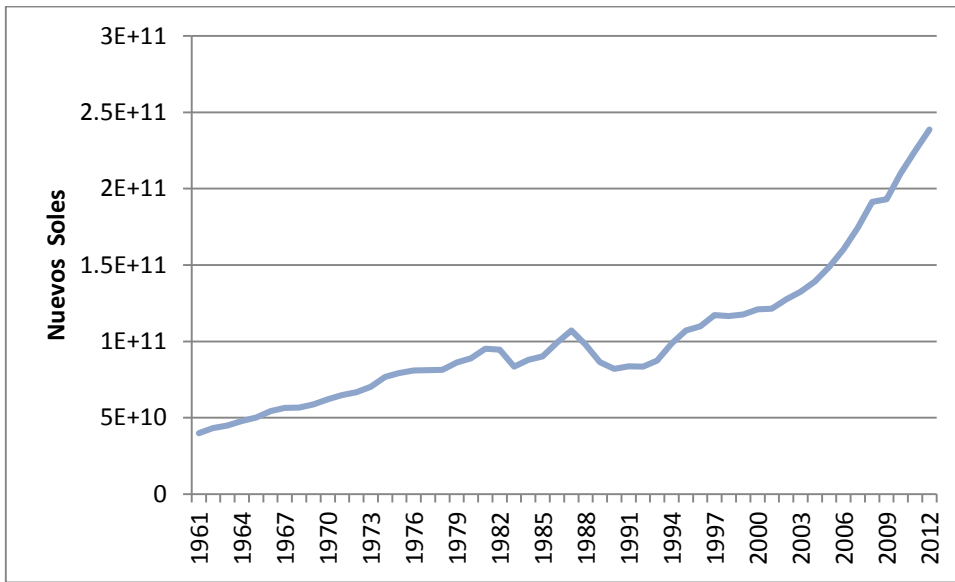
Industrial policies can help achieving structural transformation. They can happen on either a local or a global level, depending on if smaller or larger capacity leaps is the objective. Industrial policies on the local level try to improve existing industries through stepwise increases in their capacities, smaller leaps in the forest, whereas industrial policies on the global level happen through strategic bets on new industries, larger leaps in the forest (Hausmann et al 2008). Industrial policies should be formed in dialogue, where economic activities and instruments are selected, between the public and private sector (Hausmann et al 2008).

### 3. Background

#### 3.1 Structural Transformation in Peru

With growth at an average rate of 7% over the last eight years, Peru is one of the most rapidly growing economies in Latin America (World Bank 2013). See figure 4.

**Figure 4: Real GDP 1961-2012**



Source: World Development Indicators, 2014

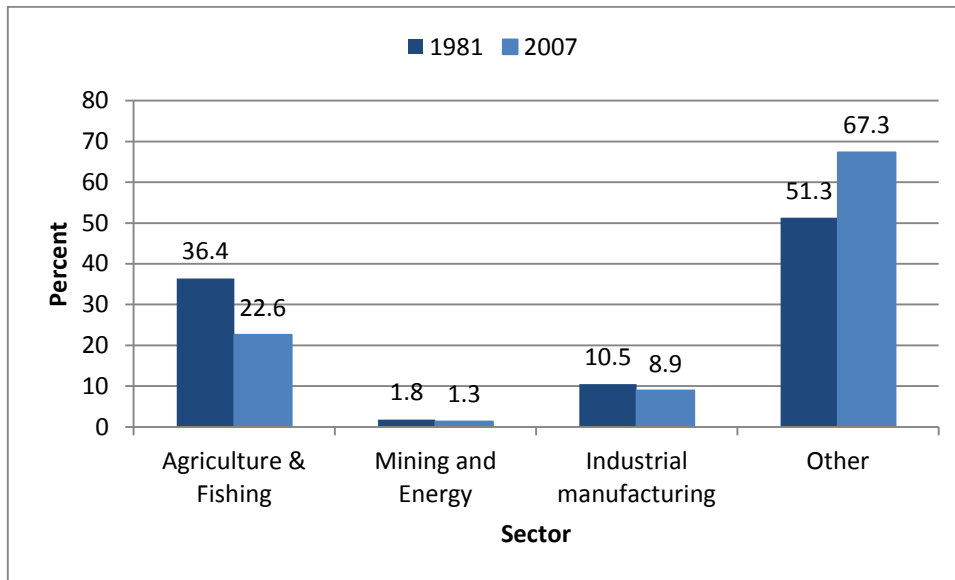
The exports of minerals and gas, which make up more than three quarters of the exports, are behind this economic progress. Large foreign investments are made in these industries (The Economist 2013). With an increasing GDP, the level of employment has risen and improvements have been made in areas such as poverty, infrastructure and education (Hausmann & Klinger 2008a).

In the Peruvian economy there has been a lack of structural transformation which has limited the welfare benefits of the export-led growth. This can be explained by how few goods that are connected to the mining and energy industries in the product space. Peru has been unable to jump to other goods that would have made the exports of the country more diverse. In addition to this issue, the mining and energy industries are capital intensive which means that they generate few jobs. An example of this is the period 1991-2000 when the mining investments boomed while the level of employment shrunk in the sector (Hausmann & Klinger 2008a).

It is important to put the current economic development in an historical perspective. Twice in the past exogenous factors lowered international prices on Peruvian natural resources. It caused a shock in terms of trade that brought inflation, a balance of payment crisis and debt deficits upon the country (Hausmann & Klinger 2008a). This is another reason why the exports of Peru need to diversify; the current export package leaves the country vulnerable to falling prices on natural resources.

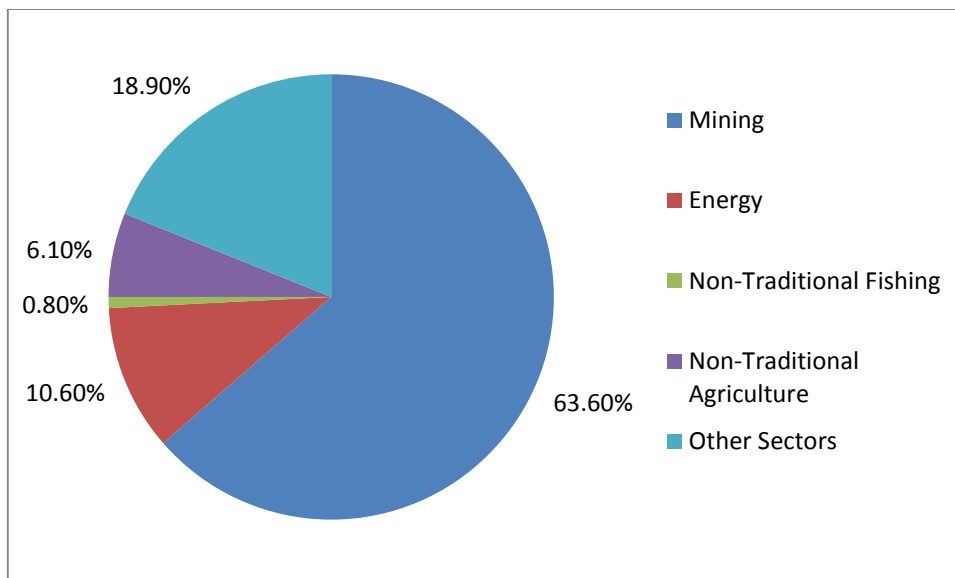
Figure 5 shows how the mining and hydrocarbon sectors employ 1.3 % of the working population in 2007. In contrast the agricultural sector is more labor intensive. Figure 6 shows what the exports are composed of when the growth accelerates in the period 1993-2005. During this period mining and energy make up 74.2 % of total exports.

**Figure 5: Economically Active Population Peru 2007**



Source: INEI, Censos de Población 1981, 1993 y 2007.(own calculations)

**Figure 6: Composition of Exports 1993-2005**



Source: Hausmann & Klinger 2008a

The non-traditional agricultural sector can help diversify the exports of Peru. Table 1 points out the high potential sectors of Peru. They are: “the sectors that have most unexploited sectors nearby, that Peru could conceivably move to” (Hausmann & Klinger 2008a, p 20). Most of them belong to the non-traditional agricultural sector, indicating that the sector has unexploited opportunities and is important for diversification<sup>3</sup>. (Hausmann & Klinger 2008a)

**Table 1: High Potential Sectors of Peru**

1	Other bars and rods of alloy steel	}	↘
2	Mollusks & aquatic invertebrates		
3	Crustaceans, fresh, chilled or frozen		
4	Dried leguminous vegetables	}	→
5	Animal products		
6	Fish, salted, dried and smoked fish	}	→
7	Phosphinates, phosphonates, phosphates		
8	Fish fillets and other fish meat	}	→
9	Dried vegetables, dried, cut and sliced		
10	Vegetables provisionally conserved	}	↗
11	Onion, shallots, garlic and leeks		
12	Ball point, felt, porous-tipped pens	}	↗
13	Sulphates, alums, peroxsulphates		
14	Fruits and nut, frozen	}	↗
15	Coconuts, Brazil nuts and cashew nuts		
16	Vegetables, frozen		
17	Coffee, coffee husks and skins		

Source: Hausmann & Klinger 2008a

### 3.2 The Agricultural Sector of Peru

Three topographic regions can be found in Peru: the Pacific coast, the Andean highlands and the tropical rainforest. They make Peru one of the most ecologically diverse countries in the world which enables it to produce almost any agricultural goods. In the coast, in the river valleys, the most of the agricultural output is produced. In the highlands and in the Amazon, the agriculture is usually at a much smaller scale serving almost only to feed the population living there (Zorilla 2013).

Despite the great opportunities to produce agricultural goods, Peru imports large amount of food products such as grains and other basic crops. Peru has therefore a deficit on its

<sup>3</sup> See Appendix on Open Forest

agricultural trade, fish excluded. The agricultural exports have been growing far less than the exports of minerals and gas (Zorilla 2013).

Peru has the world's largest single-stock fishery which accounts for around 10% of total global marine catch (Paredes 2010). Most of the income is from fish meal that with fish oil makes up the traditional fishing exports. The non-traditional exports mostly consist of captured fish (Anuario Estadístico Agropecuario 2012).

### 3.3 The Agricultural Sector of Moquegua

Moquegua, one of 25 Peruvian regions, is located on the southwest pacific coast and has 175 000 inhabitants. The exports are transported by land or sea. The Inter-Oceanic and Pan-American highways both pass through the region and carry goods to Central America and across the continent to the Atlantic sea. The city Ilo, which is important for the fishing sector in the region, there is a port from which exports are shipped to other countries. Moquegua contributes with 1.2 % to the total GDP of Peru (Carpeta Georeferencial del Departamento de Moquegua 2013).

Table 2 shows that the manufacturing and mining sectors make up 44 % of the GDP in the region. Since the manufacturing sector uses many metals much of it can be accounted to the mining sector (Carpeta Georeferencial del Departamento de Moquegua 2013). It can be concluded that like Peru, the region Moquegua has a high proportion of mining and a small proportion of agriculture, 5.6 % of the GDP. Consequently it can be said that the economy of Moquegua represents the economy of Peru quite well.

**Table 2: Value added per sector to GDP Moquegua 2010**

Activities	% of GDP	Examples
Manufacturing	22,4	Chemicals and fish meal
Mining	21.7	Copper, gold & silver
Construction	16.5	
Services	10.2	
Non-traditional Agriculture	5.6	Fish, vegetables & dairy products
Others	23.5	
	≈100	

Source: *Carpeta Georeferencial del Departamento de Moquegua, 2013*

The agricultural sector divides in two categories, the traditional agricultural sector and the non-traditional agricultural that has two subcategories. The traditional agriculture, as previously mentioned, only consists of fish meal and fish oil. The non-traditional agriculture is split in two subcategories; the fishing sector and the agricultural sector. The fishing goods are aquatic animals like fish, squid, octopus, mollusks and the goods made out of these (Gobierno Regional de Moquegua 2013). The non-traditional agricultural goods are varied and could be fruits, vegetables, grains and dairy goods (Anuario Estadístico Agropecuario 2012). Table 3 shows some non-traditional agricultural goods that were exported in 2013.

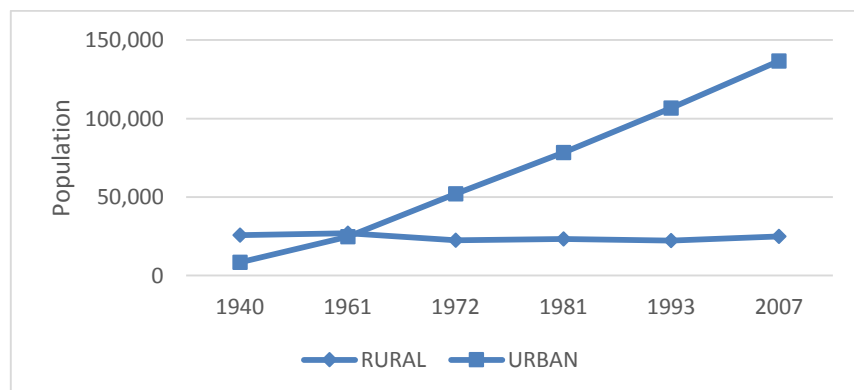
**Table 3: Non-Traditional goods 2013 in Moquegua**

<b>Agriculture sector</b>	<b>Fishing sector</b>
Avocado	Squid wings
Chili	Squid tentacles
Sweetening-product	Giant squid fillets
Wine	Mahi-mahi, fish fillets 3,5kg
Mineral water	Octopus fillets

Source: Anuario Estadístico Agropecuario, 2012

A potential threat that may limit the non-traditional agricultural sector is the urbanization that takes place in Peru (Hausmann & Klinger 2008a). People move away from the opportunities that the sector offers. This is also the case in Moquegua. Figure 7 demonstrates how the urban population of Moquegua increases over time. Meanwhile the rural population decreases even though the trend since 1993 is positive.

**Figure 7: Evolution of population in Moquegua**



Source: INEI, 2014

### **3.4 Industrial Policies in Peru and Moquegua**

Hausmann's and Klinger's policy message is that "the public sector must act to encourage the development of new export activities that better utilize the human resources of the country" (Hausmann & Klinger 2008a, s 2). This means that it is up to the public institutions to promote a diversification of the Peruvian export through using the knowledge, skills and capabilities among the people. In industrial policies, the goal is not to pick the winners as in supporting single companies but to create beneficial business conditions for existing sectors. An example is a new highway connecting a railway system to the airport making exports to new markets possible. Another example is to improve legal framework to lower market barriers for firms. These potential measures could help achieving structural transformation.

Peru needs to create a fund for development of capacities by using the generated income from the export of natural resources. This fund would focus on industrial policies on the global level by making so called strategic bets on certain industries or activities, and then back them up with the public input needed (Távora 2010). On the local level, decentralizing the execution of industrial policies would strengthen existing regional clusters. At least one example of this can be found in the region of Moquegua. In 2012 a competitive plan was created in cooperation between the public sector and the private sector (Plan Competitividad Región Moquegua 2012). The purpose of this public-private cooperation was to create a vision for 2021 by setting measurable goals for macro-economic conditions, the development of clusters for firms and for social development.

## **4. Approach and Data**

The definition of non-traditional agricultural goods is: "goods traditionally produced for domestic consumption but now exported" (Thrupp 1995). This could include any crop that is originally produced for domestic purposes but is now exported. Knowing this definition, data going 13 years back is analyzed to identify the exports of non-traditional agricultural goods.

The approach is to first look at the value and diversity of fishing and agricultural goods which provide a view on the development of agricultural exports goods from Moquegua. Second is to identify the greatest contributors, in terms of goods, to the exports. The development 2009-2013 is under focus because this is the latest period and the period where most of the change



takes place. Third is to discuss factors that may influence the findings from 2001-2013 such as policies, world market prices and crop yield. The approach ends with a semi-structured interview with the mayor of the city Ilo. The intention is to give a qualitative view that may complement the findings and to compare theory with practice in respect to policy.

This thesis does not trace causation or correlation between industrial policies and outcomes in the exports of the non-traditional agricultural sector. Nonetheless, key policies are searched for to complement the results since they are relevant and could explain the development of the exports in the non-traditional agricultural sector.

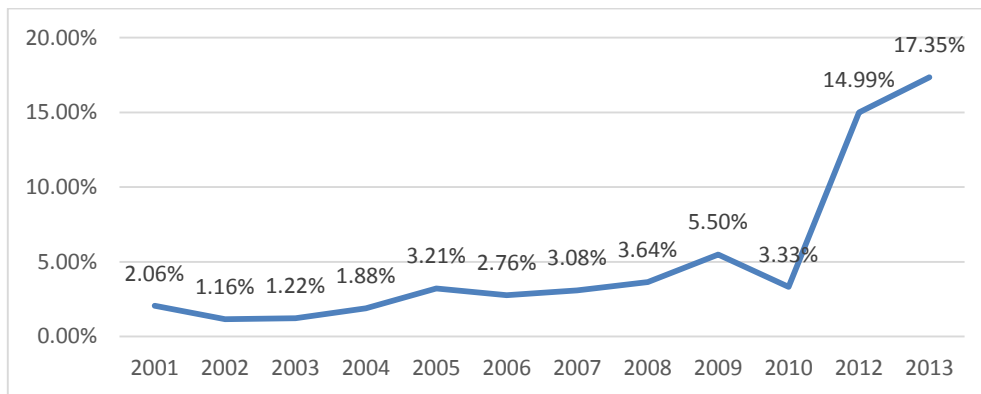
The data used to determine the value, diversity and exports is obtained from the Dirección Regional de Comercio Exterior y Turismo en Moquegua. The available information is from 2001 to 2013 and includes definitions of traditional and non-traditional goods that are taken into account. The data provides a detailed view on the exports of Moquegua. It includes information such as value and quantity of the exports, means of transport, destination, industrial codes and commercial classifications. The data has shortcomings. Notably, the year 2011 is not available which gives a less complete view of the investigated period. Data on social and economic indicators originate from the Peruvian public service for statistics, Instituto Nacional de Estadística e Informática and the World Bank.

## **5. Results**

### **5.1 Non-Traditional Agricultural Exports**

Figure 8 shows how the share of non-traditional agriculture exports develops over time as a share of total agriculture exports. There is a slight upward trend from 2002 and the share escalates 2010-2013 when it goes from 3.33 % to 17.35 %.

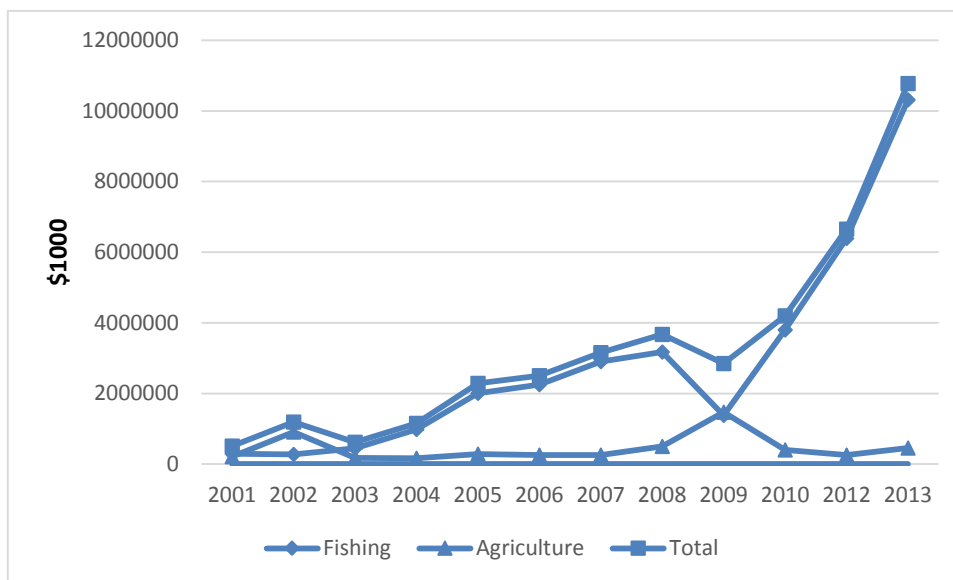
**Figure 8: Non-Traditional Export as a share of Total Export**



The agricultural exports of Moquegua become less dependent of traditional goods over time. Figure 8 does not reveal what goods or sectors that are behind the growth of share.

Figure 9 shows that the total exports grow 2001-2013, except for 2002 and 2008 when they fall. The figure indicates that the exports of agricultural goods are constantly lower than the exports of fishing goods, 2002 disregarded. In 2009 the exports of agricultural goods increase but goes back to previous levels the year after. Simultaneously, the export of fishing goods booms from 2009 and onwards. From here the fish export make up almost all of the non-traditional agricultural export.

**Figure 9: Real Value of Export from Non-Traditional Agriculture Sector**



Source: World Bank 2014 & Reuters 2014

The boom of the fishing sector 2009-2013 explains the increasing share of the non-traditional agricultural exports seen in figure 8. To see how and why the export develops this way it is motivated to identify the cause of the increase and to look at the reason why the agricultural sector does not grow. 2009-2013 is a short period of time and because of this it will be difficult to make any overall conclusions.

### 5.1.1 Fishing Exports

Figure 10 displays the fish goods that are exported 2009-2013. The mahi-mahi fillet is the main contributor to the exports 2009-2012. In 2013 the good steps back and the export of squid becomes worth more than the entire exports of the previous year. Throughout 2009-2012 the number of aquatic animals decreases because the exports of mollusks, roe and other fish cease. From 2012 the exports is only based on three types of aquatic animals.

**Figure 10: Fishing Exports**

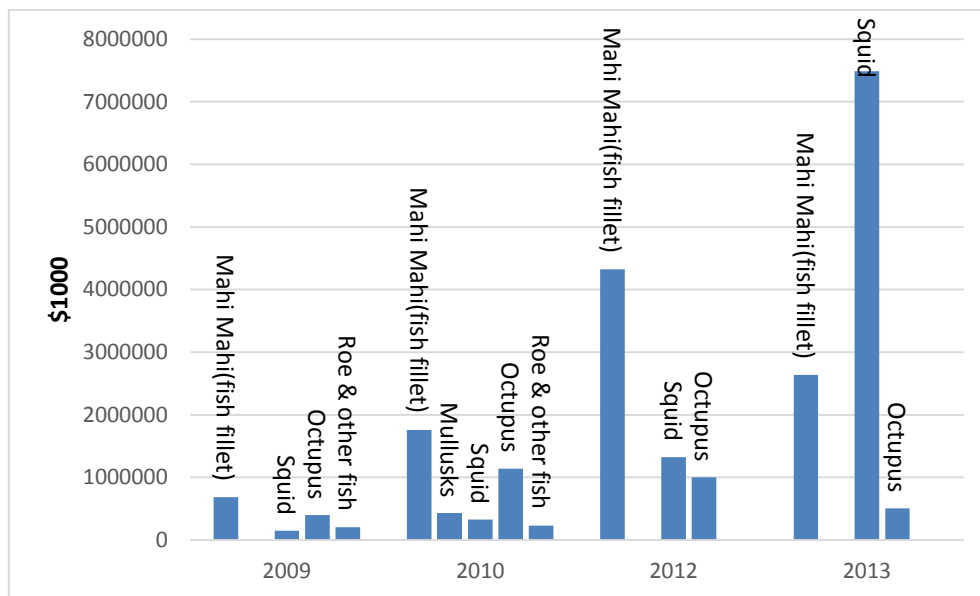


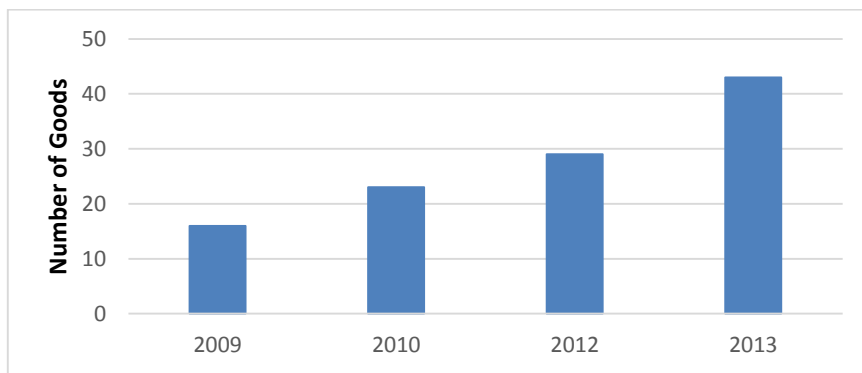
Table 4 presents some examples of varieties of exports that are made of squid. It shows that it is possible to make many goods from one aquatic animal. These varieties can also be found in the exports of mahi-mahi fillets and octopus.

**Table 4: Example of Squid Exports**

Squid skin of wings	Squid wings	Raw squids wings	Raw squids wings	Squid tentacles
Squid fillets	Squid fillets of membrane	Giant squid fillets	Giant squid wing	Squid mantle

The diversity of goods in the fishing sector is illustrated in figure 11. The exports increase from 16 in 2009, when the boom of the fishing sector starts, to 43 in 2013.

**Figure 11: Diversity of Fishing Goods**



The result establishes that the boom in the fishing sector 2009-2013 is driven by an increase in the exports of mahi-mahi fillets and squid. The observed drop in the number of exported aquatic animals does not indicate that fewer goods are exported. On the contrary, more goods are exported because the variety of goods of mainly squid and mahi-mahi fillets increase 2009-2013.

### 5.1.2 Agricultural Exports

Figure 12 shows the agricultural goods that are exported 2009-2013. It is observed how some goods cease to be exported. Oregano is the great contributor to the exports of 2009 but is no longer exported in 2013. A similar occurrence happens for conserved olives and olive oil that disappear in the exports after 2010. Avocado on the other hand, sees a positive trend and prevents the sector to fall further. The good has its best year in 2013 when it makes up nearly all of the exports accounted for in the sector. The avocado is only exported in one variety, in contrast to

squid, in the fishing sector, that is exported in different varieties. This characterizes the sector as most of the goods come with little or no variation.

**Figure 12: Agricultural Exports**

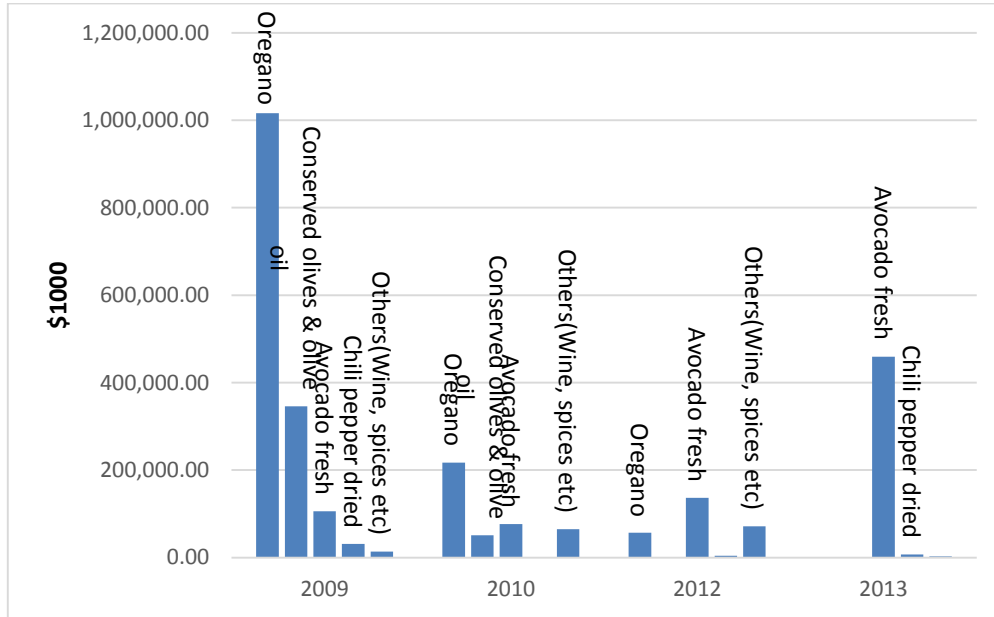
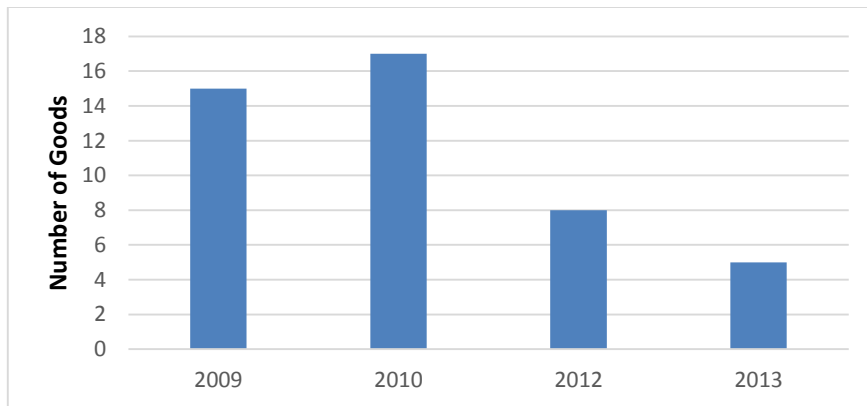


Figure 13 demonstrates how the diversity of the exports changes 2009-2013. The trend is downward and reaches the lowest level in 2013 when 5 agricultural goods are exported.

**Figure 13: Diversity of Agricultural Goods**



The findings indicate that the decline of the sector 2009-2013 happens because the export of oregano, olive and olive oil stops.

## 5.2 External Factors

While the development in terms of diversity and value has been determined, the remaining question is: what is behind the increase in exports from the non-traditional agricultural sector? Why is there a boom in the fishing industry and a drop in the agricultural sector? Below are some of the factors that could influence the development.

### 5.2.1 Restrictions on Capture of Anchovies

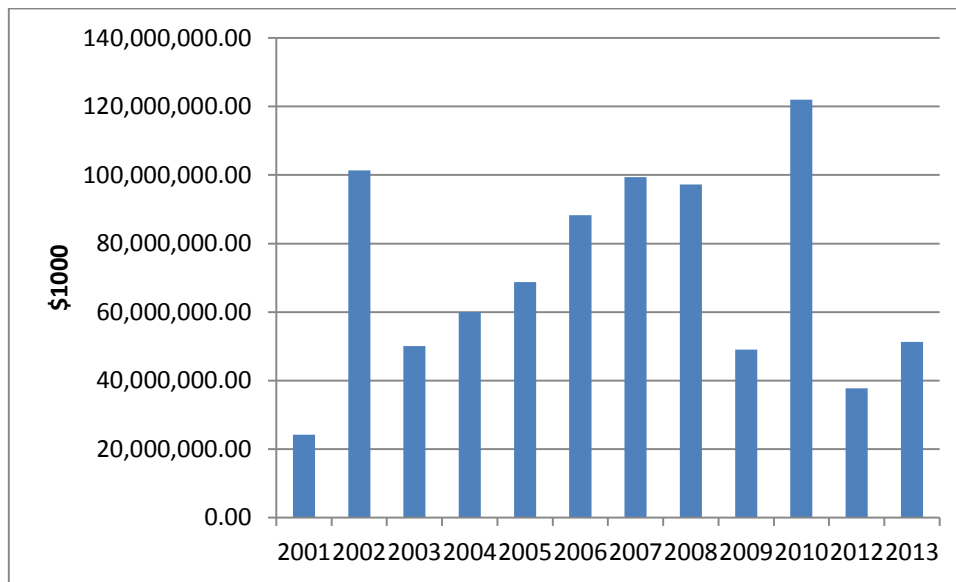
The Peruvian anchovies are used to make fish meal and fish oil, which make up the traditional agricultural exports. It is possible that changes in the exports of anchovies during 2001-2013 helped to increase the non-traditional agricultural exports.

In 1992 the government, motivated by environmental purposes, introduced a total allowable catch system which set a maximum quota for the catch of anchovies. However, since no individual property rights were assigned, this triggered a race for fish among fishing firms. Overcapitalization followed that caused reduced profits and forced the government to lower the permitted fishing days per year which in turn led to displacement of workers 2007 (Paredes 2010). The displaced fishermen from the fish meal and fish oil sectors might have started to fish squid, mahi-mahi or other fish that were observed in the exports of non-traditional agricultural fishing sector. It seems more likely that a fisherman would look for new opportunities for fishing rather than changing profession. However, to find causation more information is needed on where in Peru fishermen were displaced.

The fishing days went from 250 in 2001 to 50 in 2007 (Paredes 2010). In 2008 individual property rights were introduced and defined as shares of the total allowable catch – system. This helped increase the number of permitted fishing days back to 250 days per year in 2010 (Paredes 2010).

Figure 14 shows how the values of the exports of fish meal and fish oil develop 2001-2013 in Moquegua. The value increases 2001-2007 and decreases 2007-2013.

**Figure 14: Real Value of Fish Meal Exports from Moquegua**



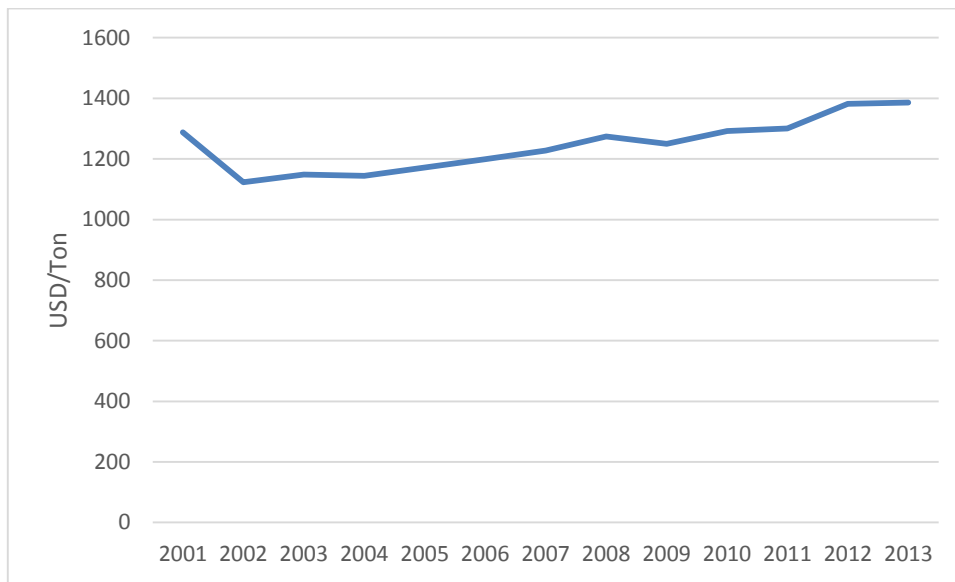
Observe that the values of the exports increase as the number of days permitted for fishing per year declines 2001-2007 and that the values of the exports decline, 2007-2009, when the number of days permitted for fishing increase 2007-2010. This aspect does not help explain the boom seen in the fishing industry 2009-2013.

### **5.2.2 World Market Prices**

In 2013 Moquegua exported non-agricultural goods to South America, North America, Europe and Asia. China and the U.S. made up around half of the exports in value that year. The goods were shipped to 20 countries, and as a result world market prices of goods influence the exports.

In figure 15 there is an increase in the world price of fish from capture 2001-2013, which could have contributed to the increase of fishing exports. The change 2009-2013 is close to 10 %.

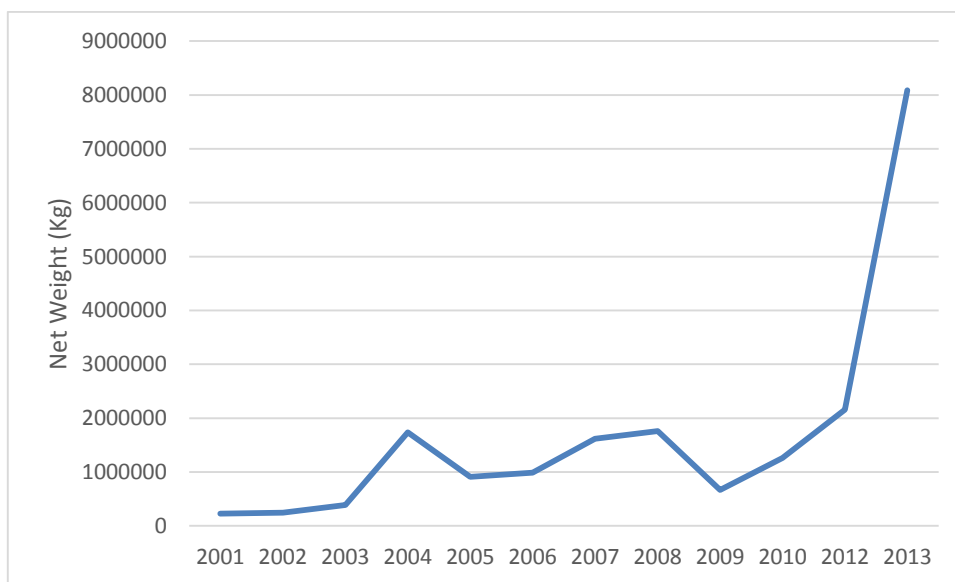
**Figure 15: Real World Market Price, Fish from Capture**



Source: Stats.oecd.org

Figure 16 below shows how the net weight of fish exports in Moquegua increases 2001-2013. The value of the exports depends on the quantity and price. Figure 15 gives an idea of the price of fish and figure 16 shows the exported quantity of fish. When looking at years 2009-2013 where the fishing sector increases, both price and quantity increase and this may explain the boom 2009-2013.

**Figure 16: Fish Exports of Moquegua**

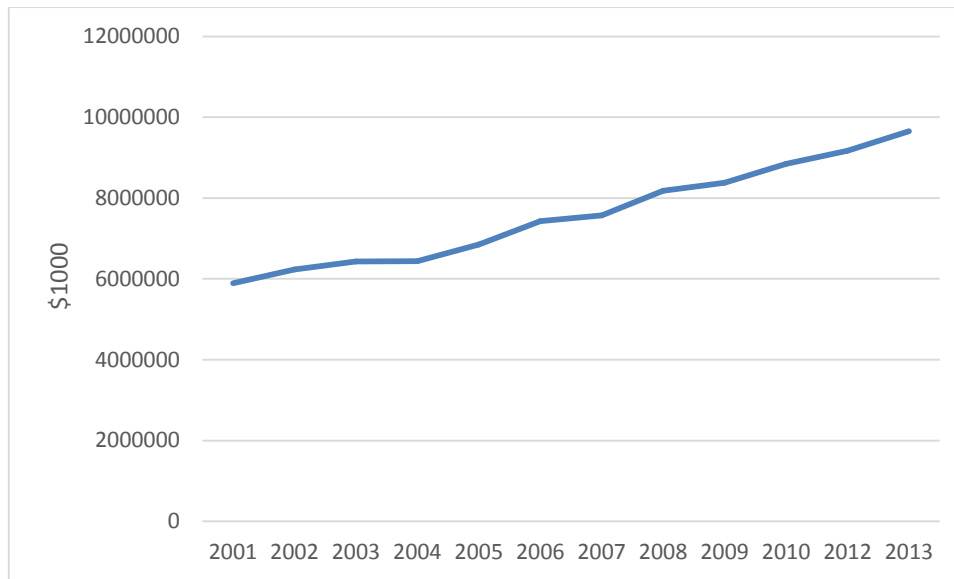




### 5.2.3 Gross Production Value

Gross Production Value (GPV) measures the output value of production. Figure 17 shows the agricultural output value in Peru 2001-2012. The output value increases yearly and could suggest that the non-traditional agricultural exports increase; however, this does not occur in Moquegua. In our findings, an explicit correlation between GVP and the exports does not seem to exist.

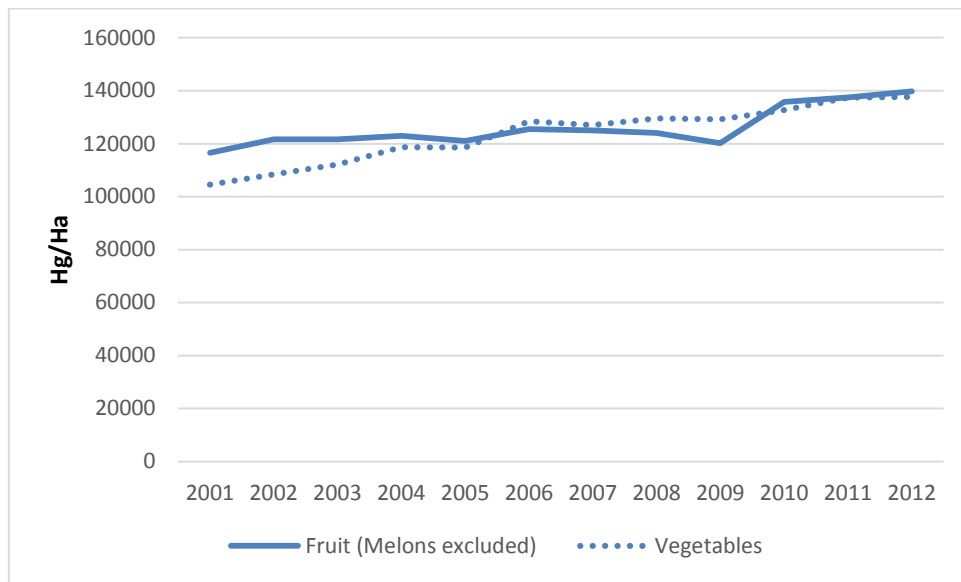
**Figure 17: Real Gross Production Value in the Peruvian Agriculture**



*Source: FAOSTAT 2014*

The lack of growth in the exports of agricultural goods 2001-2013 may be explained by bad yield caused by, for instance, a dry climate. Figure 18 below shows that the crop yield of fruits and vegetables in Peru has increased 2001-2013. It does not seem like the yield can be accountable for the lack of growth among agricultural export goods.

**Figure 18: Yield of Fruits and Vegetables in Peru 2001-2012**



Source: FAOSTAT 2014

#### **5.2.4 Characteristics of the Peruvian Agriculture**

No agricultural policies made during 2001-2013 are obtained but some factors are worth mentioning that may explain the direction of the exports of non-traditional agricultural goods from Moquegua during this period.

The biggest export goods from the traditional agricultural sector of Peru are coffee and cotton, which are produced along the coast line of Peru (Ministerio de Agricultura y Riego 2014). This may indicate that exports of coffee and cotton push the non-traditional agricultural goods aside in Moquegua. However, since neither exports of coffee or cotton appear in the results this cannot be the case, Moquegua does not export any of these goods.

More likely to explain the development seen 2001-2013 are the difficulties experienced in the Peruvian agricultural sector. The sector is characterized by disorganized production, decreasing profits and competition. Although highly diverse, the agricultural sector is poorly interconnected between the coast, Andean highlands and jungle, and therefore difficult to control from a central authority. The sector has problems with erosion and salinization but also with small sized lands which elevate transportation costs. The agricultural sector is in need of technical assistance and economic support, and commercial organizations formed by workers need to be encouraged (Ministerio de Agricultura y Riego 2014).

The Ministry of Agriculture state that goods from the non-traditional agricultural sector in Peru have great potential but that few reach the international market (Ministerio de Agricultura y Riego 2014). In Moquegua 2001-2013 there is much variation when it comes to what non-traditional agricultural goods that are exported and this might exemplify what the ministry states.

### **5.3 Policies in Ilo**

The mayor of Ilo, Jaime Valencia Ampuero, shares some of the views of Hausmann & Klinger. He sees human capital as the key for Peru to develop and argues that Peru needs a better educational system more similar to Cuba's. Ampuero claims that there is a good dialogue between public authorities and companies in Ilo, which in his view is equal to fewer worker-protests. Clearly, his perception of public-private cooperation is different from the ideas of Hausmann & Klinger, where this is emphasized as a process for achieving structural transformation.

The mayor agrees that the non-traditional agricultural sector is important for Peru. He believes that the fishing sector will be more important than the mining sector in the future because wealth of fish stays with the population while wealth of mining goes abroad. Meanwhile, he admits that there currently are no public strategies to help the fishing sector. On the other hand, decisions on restrictions are decided by the national government which could defend the lack of policies from the mayor. He distrusts large private companies that exploit natural resources to promote growth. Ampuero has invested in some infrastructure and water facilities that may help new companies.

Ilo needs a good educational system and lacks policies promoting non-traditional exports. It seems that the fishing sector is held back by restrictions on fishing and lack of strategies on local public policies.

## **6. Conclusion**

This thesis aimed to answer if the diversity of the non-traditional agricultural exports increased. The findings suggest that there is more diversity in the fishing industry than among agricultural goods. Further, it is shown that increased exports of fishing goods raised the total value of the non-traditional agricultural sector, while exports of agricultural goods contributed

little to the sector's total value. The increase in exports of fishing goods seems to be driven by an increase in exported varieties of fish. In contrast there is a halting development found in the agricultural sector which could be the result of goods appearing sporadically in the exports. This could indicate that the exports of agricultural goods are unstable. Knowing this, the agricultural sector may need to look at what made the fishing sector successful; a great variety of goods.

In an attempt to explain the findings external factors were taken into account. In Peru, restrictions on fishing days of anchovies per year caused displacement of labor and may therefore have led fishermen into non-traditional fishing. In Moquegua, this could explain the increase in exports of non-traditional fishing exports. However, these assumptions may not be true because fish meal exports and permitted fishing days do not seem to be related in the region. 2001-2013 there is an increase in both world prices and quantity of fish exported from Moquegua. This indicates that the observed increase of exports could be more than a result of shifts in world prices and this may be worth analyzing further. This could be done by performing a regression analysis to determine to what extent world price levels and other variables affect fish exports from Moquegua.

Despite an increase of output value and crop yield in the Peruvian agriculture, Moquegua's agricultural exports have not grown, which may indicate low relatedness between these variables. The development seen in the agricultural sector of Moquegua could be explained by the characteristics of the Peruvian agricultural sector. It is unstable, has low profitability and is difficult to control. If this also is the case in Moquegua, then this could be a part of why the exports do not grow 2001-2013.

The Mayor of Ilo was interviewed to complement the findings as he provided another perspective on policies. It became evident that he had a different view on the dialogue and cooperation between public and private institutions than theory suggests. In addition, it was found that Moquegua had little power in shaping policies in the fishing sector 2001-2013 since these are controlled by the government.

The increase of non-traditional goods could be a sign of structural transformation. However, the thesis is looking at a relatively short period of time which makes it difficult to tell whether the findings are short trends or indicate structural transformation.

As a share of the total agricultural exports, the exports from the non-traditional agricultural sector increased with around 2 % in 2001 to 17.35% in 2013. Despite this, the non-traditional agricultural sector remains small in comparison to the mining sector. The increase of the exports can therefore be questioned as being significant when looking at the entire economy of Moquegua. The increase is however important in another way. It means that the sector is becoming more important to the region. Since this sector is more labor intensive than mining, an increasing variety in the export of fish and agriculture could create more jobs.

Theory suggests that there are opportunities in the non-traditional agricultural sector and that the findings of this thesis show that this sector is growing in Moquegua, but this should be carefully interpreted when it comes to industrial policies. Assuming that the urban population keeps rising there will be few left to run the fishing and agricultural sectors. It may therefore be more relevant to focus policies on promoting urban based industries.

The Peruvian economy is currently growing mainly because of its mining industry; however there is a need of structural transformation to diversify exports and thereby stimulate long term growth. The non-traditional agricultural sector, with its relevance for larger and often poorer parts of the population, may contribute to this. This thesis, despite its limits, has given an insight in that respect. In future studies it would be interesting to search for causality between current policies and those leading to structural transformation, which could be done in the non-traditional agricultural sector of Moquegua but also in other regions or sectors.

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## Appendix

### Determining the Revealed Comparative Advantage

$$RCA_{c,i} = \frac{\frac{x(c,i)}{\sum_i x(c,i)}}{\frac{\sum_c x(c,i)}{\sum_{c,i} x(c,i)}}$$

Defines if a country,  $c$ , exports more good,  $i$ , than other countries do on average.  $RCA > 1$  indicates an RCA (Balassa, 1965).

### Determining the level of sophistication for a good

$$PRODY_{i,j} = \sum_c \frac{(xval_{i,c,t}/X_c)}{\sum_j (xval_{i,c,t}/X_c)} Y_c$$

Where  $xval$  is the export of the good  $i$  by the country,  $c$ , in one year.  $X_c$  equals the total export of country  $c$ .  $Y_c$  is GDP per capita in country  $c$ . Determines the income level of a good. It only determines the sophistication based on the countries that export the good. The fewer countries that export the good, the higher PRODY. (Hausmann & Klinger 2007)

### Determining the level of sophistication for the export of a country

$$EXPY_{c,t} = \sum_i \left( \frac{xval_{c,i,t}}{X_{c,t}} \right) PRODY_{i,t}$$

EXPY is the aggregated PRODY, weighted by the share of that good in the export package  $X_c$ . Determines the value of country's export. (Hausmann & Klinger 2007)

### Determining how valuable the nearby goods are in the product space

$$open\_forest_{c,t} = \sum_i \sum_j \left[ \frac{\varphi_{i,j,t}}{\sum_i \varphi_{i,j,t}} (1 - x_{c,j,t}) x_{c,i,t} PRODY_{j,t} \right]$$

Taking the proximity in product space between the goods  $i$  and  $j$ ,  $\varphi_{i,j,t}$ , if  $RCA > 1$   $x=1$   $RCA < 1$   $x=0$ , and the level of sophistication PRODY into account. (Hausmann & Klinger 2007)



The open forest is a country measure. The more sophisticated goods that are close to already produced goods, the higher open forest value a country has. In the paper, table 1 looks at what that are in Peru's open forest.