

“Precios y Cambio Económico. El Espacio Peruano, 1591-1790.”

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Resumen: En este trabajo se elaboran series de precios correspondientes al Espacio Peruano (actuales Bolivia, Perú y Chile) que cubren el periodo 1591-1790. Con las series se elaboran índices de precios relativos de productos tierra intensivos respecto de precios de productos mano de obra intensivos. Dichas series posibilitan el testeo y corroboración de las afirmaciones tradicionales sobre historia demográfica de la región, que han sido más bien de índole cualitativa ya que no se poseen estadísticas poblacionales comparables antes del siglo XVIII. Las series de precios elaboradas junto con información sobre salarios nominales durante el siglo XVIII, permiten concluir un proceso de aumento de la productividad que contrarrestó posibles tendencias malthusianas. Se especula que este aumento de la productividad se debió a una liberalización de la economía, en especial de la mano de obra indígena.

“Prices and Economic Change. The *Espacio Peruano* Region, 1591-1790.”

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Abstract: In this paper price series for the Espacio Peruano Region (today's Bolivia, Chile and Peru) are elaborated covering the period 1591-1790. An index of relative prices is built that compares land intensive versus labor intensive products. The series allow testing (and confirming) the traditional vision presented by demographic historians, that has been based more on qualitative than on quantitative data (since no general and comparable censuses exist for the region before the end of the XVIII century). The price series, jointly with information on wages, allow to conclude that during the XVIII century a rise in productivity occurred, despite an important increase in population. A possible explanation to this phenomenon is that the increase in productivity was caused by a liberalization of labor markets, specially affecting the Indian population.

Prices and Economic Change. The *Espacio Peruano* Region, 1591-1790

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The relationship between factor endowments, such as population, and relative prices has been analyzed in classical works of economic history, since Adam Smith¹. From the point of view of economic theory relative prices have a direct relation with factors and the intensity of their use in the different goods produced. In consequence, changes in population provoke changes in the relative prices of the different types of goods. Classical studies on this subject are Phelps Brown and Hopkins (1956), where they analyze prices and wages in England and Europe, starting in the XIIIth century. They show how the fall in population provoked by the Black Death resulted in a progressive rise in the retribution of labor, in terms of agricultural goods. Earl's Hamilton's (1983, 1988) works on prices in Spain between 1500 and 1800 also describe the evolution of the relationship between the value of products differing in factor composition: during the XVIth century agricultural goods showed a continuous increase in value in relation to those non-agricultural. This situation was modified in the first half of the XVII century, presumably due to the fall in the Spanish population. The aforesaid tendency was reinitiated in the second half of the XVIIth century and was prolonged up to the 1800's (Hamilton, 1983).

The most extraordinary historical case of change in the labor endowment was produced by the fall of the American indigenous population after the arrival of the Europeans. It is estimated that the decrease was of 90% in Mexico and 50% in the Andes (Sanchez Albornoz, 1994). The economic repercussion of this change has been

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¹ See, for example, Newland and Wassbein (1984).

pointed out frequently, although there are no specific studies of the impact on the local terms of trade. Unfortunately, the analysis is difficult to apply to the XVIth century, given the absence of price series. On the other hand, prices for the XVIIth and XVIIIth century are available. This essay analyzes the evolution of prices and relative prices in the *Espacio Peruano* Region (defined here as current Peru, Bolivia and Chile) between 1591 and 1790. After describing the price series used, the evolution of relative prices is described highlighting their relationship with population trends and climatic and epidemic catastrophes. Regional differences are also mentioned. Later, the evolution of the general level of prices is reconstructed, and contrasted with the fragmented information available on wages. The essay concludes with some hypothesis on the evolution of productivity.

Studying the changes in relative prices is especially interesting for the Andean zone, given the lack of general and accurate information regarding the magnitude of population and its variations before the end of the XVIIIth century. Studies on population suggest that after the strong impact of the Conquest, population continued decreasing until mid XVIIth century, when the trend was reversed. During the XVIIIth century, in particular after 1730, the population would grow rapidly (Sanchez Albornoz, 1978,1994), in some cases even triplicating itself (Tandeter and Boleda, 2003).

The price series

Price indexes and relative prices series are elaborated in the present section. Price data comes from Macera (1992) for Lima (Lower Peru); from Ramón and Larraín (1982) for Santiago de Chile; and from Tandeter and Wachtel (1992) for Potosí (Upper Peru).

Price index components are divided in two categories: agricultural and textile. Agricultural products are considered land intensive, whereas textile products are considered labor intensive. The products selected to elaborate the agricultural index for Lima (1591 to 1790) are corn, wheat, and potatoes. The textile index was built based on the prices of tocuyo (a cotton textile) and sayal (a wool textile). For Potosí (1671 to 1790) wheat and potatoes are used as agricultural products; the textile goods are tocuyo, sayal and sayalete (wool textiles). For the Santiago de Chile (1691 to 1790), wheat, potato and “local textiles” prices were used.

For certain years there is no data available on some products. When missing data corresponds to two or more consecutive years, they have been completed according to the linear trend of the series. Agricultural and textile price indexes were obtained with the simple average of partial indexes for all products in each group. In the case of the aggregate price index for the *Espacio Peruano*, weights used for Lower Peru, Upper Peru and Chile were those of aggregate production, 1741-50 (Newland 2003).

The *Espacio Peruano* relative price index is the result of the quotient between the agricultural and textile index. The base for the regional relative price indexes is the beginning of the series. The aggregate series (*Espacio Peruano*) uses 1671-89 as the base.

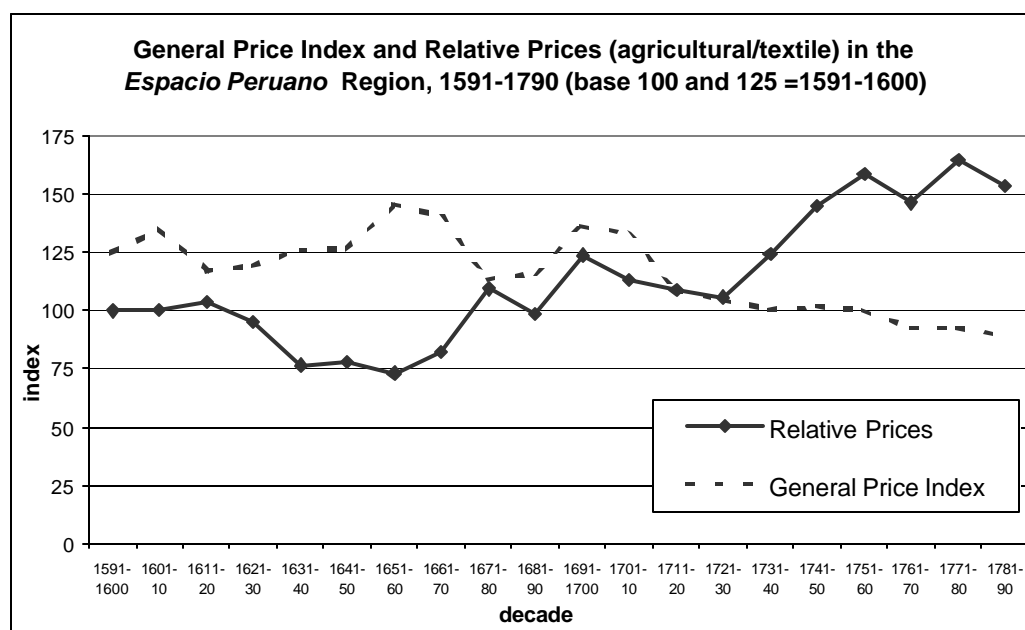
The evolution of relative prices

In general, the evolution of relative prices for the *Espacio Peruano* corresponds to the images presented by demographic historiography. In Graph A the evolution of land-intensive versus labor-intensive price indexes can be observed, starting in the late XVIth century. It can be pointed out that the index falls until mid-XVIIth century, which

corresponds to the common view that the population continued its downfall from its high initial numbers due to diseases and ill-treatment (Sanchez Albornoz, 1994). During these decades labor would continued grow scarce.

The impact of demographic downfall on agriculture was significant. Marginal land was abandoned in order to focus production on more productive land. On an institutional level, the Spanish Crown applied a policy of spatial reorganization until 1570, forcing natives to concentrate in *reducciones*. At the same time it established forced labor (*mita*) and tribute cash payments. The concentration of the occupied space left vast territories unused (Stavig, 2000). On the other hand, natives saw themselves in the need to sell their land in order to pay the tribute (Stavig, 2000; Charney, 1999). The abundance of land led to the downfall of prices for land intensive products.

Graphic A: General Price Index and Relative Prices (agricultural/textile) for the *Espacio Peruano*, 1591-1790 (base 100 and 125 = 1591-1600)



Sources: Elaborated with price data included in Macera (1992), Ramon and Larrain (1982) and Tandeter and Wachtel (1992).

In Lower Peru (current Peru), the demographic collapse of the XVIth century led to

the abandonment of marginal land (Charney, 1999). For some regions, like Trujillo, the demographic impact of the Conquest was so strong that, in the XVIth century, land was sold on the value of the cattle it included (Ramirez, 1986; 223). Facing this situation, Spaniards occupied any available land (Charney, 1999; 44-45). A vast part of land transfer to Spaniards took place in the XVIth and XVIIth centuries (Stavig, 2000; 111)². During the first half of the XVIIth century, due to the continued decrease in population, the lack of manpower grew acute. Wages might have been even doubled for this reason (Ramirez, 1986; 130-131). Natives would abandon agricultural firms in which labor conditions were abusive (Salas de Coloma, 1998; 466-467). This drove landowners to compete for available manpower, as has been stated in judiciary files³. At the same time, land was abandoned for lack of manpower (Ramirez, 1986; 167). In Chile, also until mid XVIIth century, land was abandoned due to a shortage of population (Gongora, 1960; 39). This explains why natives received higher salaries than those stipulated by official regulations (Gongora, 1960; 67).

Graph A also supports the idea of population recovery starting in mid XVIIth century, as has been suggested by demographic historiography. This tendency, reflected in the growth of agricultural versus textile prices, continues up until the XVIIIth century. The growth in population increased available labor supply. Prices of labor intensive products (textile) descended on a greater scale than those land intensive (agricultural), leading to a increase of the relative price index. The rise of agricultural prices and population in the XVIIIth century, along with the expansion of the local market, placed pressure upon available land. From mid-century on, land became

² Land appropriation during the XVIth and XVIIth centuries can be observed in other regions, for example Cuzco (Glave and Remy, 1983; 87-89)

³ National Archive and Library of Bolivia (Archivo y Biblioteca Nacional de Bolivia - ABNB), EC, 1656, 1. See also: EC, 1659, 7; EC, 1661, 8; EC 1664, 4; EC, 1665, 10; AM, 1611, 1; AM, 1612, 9; AM, 1616, 3, among others.

scarcer. Proof can be found in the increase of indigenous demands petitioning for sold or formerly abandoned lands (Stavig, 2000)⁴. These demands turned violent in Upper and Lower Peru, due to the shortage of land (Ramirez, 1986; 303). In other regions, like Piura (north of Lower Peru), an expansion of the agricultural frontier was attempted, recovering land abandoned in the XVIIth century and incorporating new land (Diez Hurtado, 1999; 291).

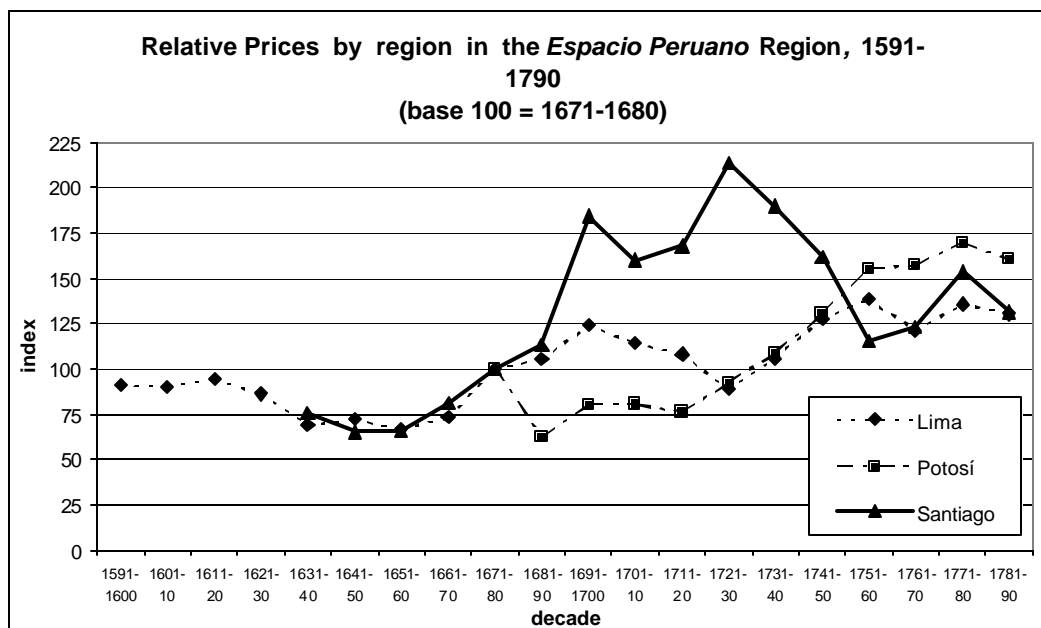
Two catastrophes altered this gradual tendency. The first was the earthquake that affected the region of Lima in 1689, producing a collapse in land productivity. Consequently an increase in the price of agricultural goods followed. The city of Lima saw itself depending on wheat imports from Chile; this demand increase produced a price rise of agricultural products in the Chilean market. The second catastrophe was the severe plague that devastated both Upper and Lower Peru between the years 1717 and 1723. Henceforth the decrease of the relative price index for the decade of 1721-1730. From 1731 on, the index rises, a clear sign of the continuous growth in population. In the last decade the index drops, probably due to the casualties left caused by Tupac Amaru's Great Rebellion.

Differences in the evolution of land and labor for each region can be observed in Graph B. In Chile, which was the agricultural frontier for Lower Peru, the agricultural/textile relative price increased due to Peruvian demand, from 1691 on. The cost of land lease, once insignificant, took on a new importance (Gongora, 1960; 74). As a result, new farming land was incorporated up until mid-century (Larraín, 1992; 103-107). The supply sought a new balance with the expanded demand, reaching a culminating point towards the middle of the XVIIIth century (Larraín, 1992; 227). Interruptions in this process can only be observed in the 1720's, caused by natural

⁴ In these conflicts, many times the request would be originated on land lost in the past century. One of

catastrophes (Larraín, 1992; 283-289) (Villalobos et al, 1980; 229).

Graph B: Relative prices by region in the *Espacio Peruano*, 1591-1790 (base 100=1671-1680)



Sources: see Graphic A.

For Lower Peru, the end of demographic fall and the beginning of population growth in the second half of the XVIIth century can be confirmed. With the rise in population, the labor supply grew, and consequently the relative price index increased. The 1691-1700 climax can be explained by the agricultural crisis of 1689. Also in Upper Peru, a recovery in population is observed, starting in late XVIIth century and coming to a halt in 1719-1720 on account of the plague (Larson, 1998; 98). The plague made an impact later on in Lower Peru, also causing a transitory change in the index.

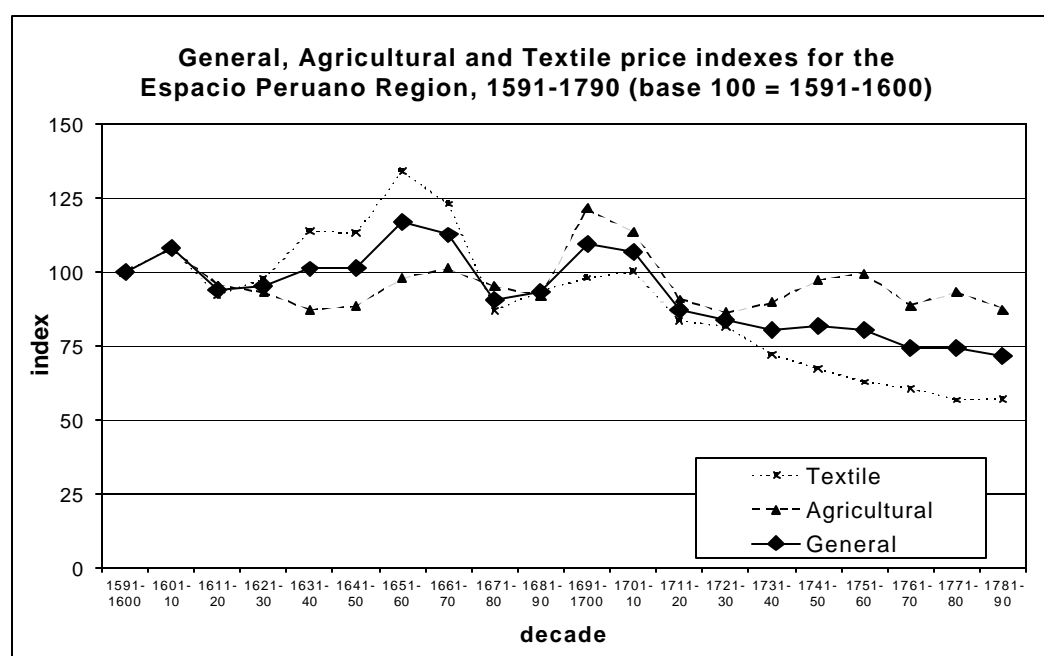
The general level of prices, wages and production

A general price index was built averaging the agricultural and textile price series

these cases can be observed in the first half of the XVIIIth century, in: ABNB, EC, 1741, 93.

(Graph C). The general price level shows a certain stability throughout the XVIIth century. To a large extent, this is due because the rise in textile prices –starting after 1600- was compensated with a fall of agricultural prices. Agricultural and textile price levels converge again towards the year 1700. In the last decade of the XVIIth century the price level strongly rises due to the increase in agricultural prices provoked by the earthquake that affected Lima in 1689. The price level returns to its previous level towards 1710. For the remaining XVIIIth century a continued deflation is observed, caused by a drop in textile prices.

Graph C: General, agricultural and textile price indexes for the *Espacio Peruano*, 1591-1790 (base 100= 1591-1600)



Source: see Graph A.

Available estimates show production growth for the XVIIIth century. In Upper Peru production rose steadily since 1730 (Tandeter and Wachtel, 1992). In Chile, Ramon and Larrain (1982) observe a rise in production from the late XVIIth century on. Larson (1998) suggests the probability that towards the year 1740 demographical and production growth took the region out of recession. Newland (2003) and Newland and

Coatsworth (2000), which give general estimates of production for the region also note the same increase. That is to say, deflation in the XVIII century was accompanied by a growth in production. One possible explanation is that this occurred due to a increase in economic productivity. This hypothesis is strengthened with the analysis of real wages.

Prices and wages

Normally, real wages are a clear sign of increased productivity in the economy. With available but fragmentary information on wages (for Lima, Chile, Potosi, Trujillo and Arequipa) a nominal wage series for the *Espacio Peruano* Region was elaborated (Table 1). The contrast between nominal wages and the evolution of prices allows us to estimate real wages.

Table 1: Prices and wages (nominal and real) for the *Espacio Peruano*, 1701-1790. Base= 100, decade 1701-1710.

Decade	Nominal Wages	Prices	Real Wages
1701-10	100	100	100
1711-20	99	82	122
1721-30	107	79	136
1731-60	104	75	138
1761-70	104	69	150
1771-80	104	70	149
1781-90	106	67	159

Sources: Lima: Macera (1992; I, xxiv); Chile: Carmagnani (1963; 81 -83); Potosi: Tandeter and Wachtel (1992); Trujillo: Ramirez (1986; 240); Arequipa: Brown (1986; 48). Wages for Lower Peru were calculated based on wages in Trujillo, Arequipa and Lima. Weights are those used for the construction of the general price index.

The real wage index shows a clear improvement throughout the XVIIIth century, which is particularly notable since it took place in a time of population growth. Once again, the most plausible explanation is an increase in general productivity. This increase could be the result of a reduction in institutional limitations to trade and

production. Feudal-like mechanisms that implied working under coercion (*mita*, forced labor in *obrajes*, *encomiendas*) lost some importance throughout the XVIIIth century. These inefficient forms of labor changed towards free forms of labor employment, or towards production on the basis of indigenous entrepreneurship⁵. This led to an overall improvement in labor productivity. Following, is an analysis on some of the changes observed by region.

Mining production on the *Espacio Peruano* increased significantly during the XVIIIth century; on one hand, with the incentive of tax rate reduction. On the other hand, this increase in production was achieved by employing free labor. The participation of forced labor (*mita*) in the total mining labor force was reduced. Forced labor was mainly located in Potosi and Huancavelica; towards 1789 three fourths of total mining labor became salaried. Hired labor increased in Potosi (Bakewell, 1990; 70) and the amount of forced labor seems to have dropped during the XVIIIth century (Zabala, 1980). There are indications that suggest a decrease in the contribution of indigenous population to Potosian *mita*; which was then compensated by waged miners (Saguier, 1989). Potosi's production also lost importance overall for the area, since mines employing free labor, like Oruro, Charangas, Chucuito, Pasco and Huaylayoc, were growing faster (Fischer, 2002). In Lower Peru, in the region of Jauja (Huancavelica), a large portion of mining laborers were free by the end of the XVIIIth century. In mining centers like Pasco all labor force was free (Meyers, 1986; 101).

For a large part of the colonial period textile production developed mainly in *obrajes*. These were workshops of medium to large dimensions, of Creole or Spanish property, and where almost the whole of the production process took place (from the cleaning of fibers to the weaving of the fabric). Usually they employed forced labor or minimum

⁵ The Peruvian case contrasts with the Mexican case, where all through the XVIIIth century population

wage labor, or both. During the first half of the XVIIIth century, *obrajes* reduced the number of forced labourers. For example, in the Cacamarca *obraje* towards 1730 a large quantity of workers were salaried (Salas de Coloma, 1998; 394). Some of them would even raise wages to hold on to laborers (Salas de Coloma, 1998; 339, 468). In the second half of the century, indigenous domestic production (*chorrillos*) competed with *obrajes*, resulting in a general price fall.⁶ Towards the end of the XVIIIth century, many *obrajes* had vanished (Macera and Abanto, 1964; 100, 114). According to a contemporary traveler, Concolorcorvo (1942), *chorrillos* were the cause of the *obraje* crisis and the price plummet. Several studies show that *chorrillos* thrived in Upper Peru in the late XVIIIth, in regions like Cuzco (Morner, 1978; 84) or Cochabamba (Larson, 1998). The production in *obrajes* fell, but was overcompensated by the increase in *chorrillo* quantity and production. (Escandel Tur, 1997). The same scenario can be observed in Huamanga, where, towards the end of the XVIIIth century, the manufacture of *sayal* and *cordellate* went from being located in *obrajes* to taking place in indigenous households (Salas, 1986; 213). In Chile domestic production (flannel generally), imposed itself over the production in *obrajes*, causing their decline in the XVIIIth century. (Villalobos et al, 1980; 173). The high mobility of labor was yet another dynamic factor. In Upper Peru, during the second half of the XVIIIth century, Indian laborers would move from *obraje* to *obraje*⁷ (Stavig, 1999; 144-153). Some provinces, like Cochabamba, seem to have particularly benefited with the arrival of workers from other regions (Larson, 1998; 100-101).

Agricultural production grew strongly in the XVIIIth century (Newland and

growth seems to have had a negative effect on the standard of living. See Reher (1992).

⁶ “A *chorrillo* was a small workshop with no fulling mill, commonly set up by natives, with no more than six looms. *Chorrillo* workers were usually members of a family, (...) basically an exponent of domestic industry.” (Santisteban, 1964; 33)

⁷ In the XVIIIth century, the majority of textile *obrajes* workers were not of local origins (Stavig, 2000).

Coatsworth, 2000), due in part to the raise in hacienda production, but also due to the increase of indigenous production. In Lower Peru small sugar mill production caused a drop in the price of sugar (Ramirez, 1986; 236). In these mills, sugar cane was cultivated and processed, generating complaints by landowners and tradesmen on account of growing competition (Macera y Abanto, 1964; 42). Also haciendas and refineries started employing non-forced labor on a larger scale. For example, in Trujillo (Lower Peru), landowners had to seduce free workers with salaries and additional in order to obtain labor. There is also evidence that Lower Peru's refineries employed free labor on a larger proportion than forced labor (Ramirez, 1986; 180, 296). The same situation is seen in the region of Cuzco, where all through the XVIIIth century the quantity of salaried workers rose, possibly due to a decrease in local forced labor (Glave and Remy, 1983; 357). In Chile we come across a particular case: the wheat exporting boom to Peru in the XVIIIth century increased agricultural development. The agricultural production growth took place via salaried labor. *Encomienda* and *mita* were of no significance (Vilallobos et al, 1980; 223, 236-239).

These examples on types of labor used in the XVIIIth century are consistent with the general view. In the cities, like Arequipa, free laborers were predominant (Millones, 1978; 21). For the area of Chile, it seems that free labor was already central in the XVIIth century, whereas indigenous forced labor lost economic significance (Vilallobos et al, 1980; 167).

Bourbon legislative change led to the liberalization of labor. Even if the *mita* system continued in some regions (like Potosi), in other areas it was permanently abolished towards 1720⁸. We can also verify a strong political tendency towards the ceasing of

⁸ In Lower Peru (Ramirez, 1986;181) as in Chile (Gongora, 1960; 68).

forced indigenous labor in textile *obrajes* and *haciendas*⁹. This can be traced as early as 1679 in the region of Chile, where King Felipe IV ruled against indigenous forced labor, and established free labor, with wages calculated upon the cost of living¹⁰.

Conclusions.

The evolution of relative prices in the *Espacio Peruano* confirms the suppositions developed by the demographic historiography. The series indicate that throughout the XVIIth century the population kept falling, leading to a increase in price for labor intensive products in relation to agricultural ones. The opposite is observed in the XVIIIth century, confirming evidence of a substantial growth in population. Catastrophes, like the 1689 earthquake in Lima, and the plague that devastated the whole region in the 1720s, affected relative prices as expected. On a regional level, the fluctuations of relative prices were diverse. Upper and Lower Peru share similar trends, whereas Chile shows differences, especially after 1690.

The general level of prices for the *Espacio Peruano* is stable for the XVIIth century, falling in the XVIIIth century. The price decrease coexists with a increase in production¹¹. This fact, along with wage evolution, implies a rise in productivity during the XVIIIth century. This was caused presumably by a more efficient use of productive factors. The increase in productivity favored workers, due to the raises in real wages. On the other hand it benefited the colonial State, which drained part of the income through a raise in taxation (Newland and Cuesta, 2003).

⁹ Like the 1704 *Real Cédula* ordering the cease of forced labor use in *obrajes* in the Viceroyalty of Peru (Zabala, 1980; 4).

¹⁰ See Jara and Prieto, 1965; 335.

¹¹ The price trends are consistent with Romano's (1993) observations on price stagnation in the XVIIth century and price decreases in the XVIIIth century. But it does not follow his assumption that they have

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opposite behavior in relation to Europe, in terms of relative prices. Spanish and America relative prices display the same trend in the XVIIIth century.

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