Water Rates and Responsabilities of Direct, Indirect and End-Users in Spain.

Ignacio Cazcarro Castellano[a,b]

Rosa Duarte Pac[a,c]

Julio Sánchez Chóliz[a,d]

Cristina Sarasa Fernández[a,e]

[a] Department of Economic Analysis, University of Zaragoza, C/ Gran Vía 2, 50005 Zaragoza (Spain); [b] Icazcarr@unizar.es; [c] rduarte@unizar.es; [d] jsanchez@unizar.es; [e]543144@unizar.es

Abstract

In Spain, irrigation is the main user of water, approximately 80% of direct use, and the price paid for this water has been lower than its cost. The recent Water Framework Directive of the EU requires that all cost should be recovered but its application is having perverse effects. In some cases, farms become economically unviable and, in others, cultivation is intensified (double harvests, changes of crops,...) and water consumption is increased. This paper uses the computable general equilibrium (CGE) model developed by International Food Policy Research Institute (Lofgren *et al.*, 2002), in which we have introduced some changes. The model is applied to a SAM of the province of Huesca, a region in north-east of Spain that has nearly 200.000 hectares of irrigated land. The model disaggregates the agricultural sectors in irrigated and unirrigated land. It also incorporates improvements in the efficiency of irrigation. Under this framework, we analyse different scenarios of payments (as they fall on direct users, exporters or end-users). In this way, we go deeply into the responsibility of users, the impact of international market and macroeconomic impacts on agriculture and industry in Spain.

Key words: CGE, User responsibility, End-user, Water rates, Virtual water.

1. Introduction.

Water resources have had a great importance in Spanish agriculture from ancient times, we can remind Contrebia Belaisca Bronze at 89 B.C., on the water distribution between two communities. During the Middle Ages and the Modern Age, many irrigation projects were developed especially in the Valencia region and in the Guadalquivir and Ebro Valleys. The water distribution rules have long been regulated by customary practices and traditional laws that they were transmitted orally for generations until they were incorporated in written orders. Water has always been considered a *common* rather than a *private* good, and the communities of farmers had their own local institutions to regulate and maintain water sources (this is the origin of today's *comunidades de regantes*, or irrigation communities) and often their own courts. For example, the *Tribunal de Aguas* in Valencia is perhaps the best-known example, who has over a thousand years, see Del Campo Garcia (1996).

The expansion of irrigation and the creation of large-scale systems at the beginning of the 20th century put an end to this situation. Public intervention was initiated in Irrigated land and water planning became a tool of economic development and the previous situation was modified. On the one hand, the investment required was initially funded by State, and a big part of the maintenance costs were returned by all citizens (not just farmers) via taxation. On the other hand, the major migratory flows that took place in the second half of the 20th century caused a break with traditional practices, and water became an economic input. In addition, the growing environmental impact generated by the irrigation water demand throughout the 20th century and the need for modernization of irrigation to increase efficiency, have put on the table the discussion on costs and financing.

The dominant response to these problems has been to reinforce the view of water as an economic input, without thinking about other functions for community, and to consider that all costs should be borne by direct users. This is thinking behind both the Spanish Water Act of 1985 and European Union Directive 2000/60/EC, also known as the Water Framework Directive (WFD), which requires the recovery of all financial and environmental costs associated with water and establishes the aim to ensure that continental and coastal waters achieve a good ecological status.

The realization of this trend so far has been to hold that direct users are responsible for all the costs, and to consider that non-users pay the benefits that they receive from water through product prices, and proper use is not their responsibility. However, we should not forget that the transfer

costs is not perfect, they fall more heavily on the payers of water charges, relieving indirect users of a part of their social responsibility.

Most of the water consumption is largely associated with farming to grow food for consumers or to generate export income. But the water needed for survival or for income via exports cannot be the sole responsibility of farmers, since the benefits of both activities are shared by the whole of society. In this light, it would perhaps be rational if the costs associated with water use were borne by both agriculture and direct users, and by other beneficiaries, so that all are interested in efficient use and in reducing negative environmental impacts. To some extent this has happened in recent decades in Spain, where society as a whole has paid a significant part of water costs via taxes, but has at the same time become increasingly aware of environmental issues and acted to drive efficiency gains in the use of water.

In this context, our aim is to outline the potential effects of greater social co-responsibility for water use, thanks to distribution of the costs necessary to modernisation of the irrigation system and to improve efficiency which it is used. This is in line with recent researches on a shared environmental responsibilities, see Munksgaard and Pedersen (2001), Peters and Hertwich (2006), or Cadarso et al. (2009). To achieve this object, we will rely on a computable equilibrium model, see Ballard et al. (1985) or Shoven and Whalley (1992), which includes the public sector and the foreign sector, and it also allows us to consider changes in tax rates, on patterns of consumption and foreign trade. Also, the model allows us to study water uses and costs in an open economy, where possible water flows associated with imports and exports commodities are considered.

According to these objectives, the structure of the paper is as follows. Following this introduction, in the second section we present the real situation in Spain in the *Comunidad de Riegos del Alto Aragón*, a large community of farmers that will be used as a reference. In the third section, we discuss the methodology used and we defined some scenarios of payment of modernisation. In the fourth and fifth we analyse the results of each scenario simulated, without improvement in productivity of irrigation system. In the next section, we assume that there is an increase in productivity of irrigation system, and we finish with a section of conclusions and final remarks.

2. A Spanish case study: the *Comunidad General de Riegos del Alto Aragón*.

The implementation of the model requires the availability of a baseline initial, it will be the *Comunidad General de Riegos del Alto Aragón (CGRAA),* an integrated irrigation system with over

125,000 hectares, it also supplies many localities in the provinces of Huesca and Zaragoza and ten industrial estates, from which we have extensive direct information. Due to its characteristics, this community is very representative of irrigation in the Ebro Valley.

The CGRAA irrigation system, like the majority of its peers in Spain, has come close to the maximum limits of use in recent years, suffering serious water shortages in drought years and coming under intense social pressure. Farmers and other users demand more regulation, at the same time as scientists and green groups propose a reduction or stabilisation in the area under irrigation, in order to limit and reduce environmental impacts. The solution adopted has been to modernise the irrigation system by switching from blanket to aspersion or drip systems, which has resulted in efficiency gains of between 10 and 15%. Up to now, modernisation process has been financed mainly by the farmers themselves, in accordance with Spanish Water Act, 1985 and the Water Framework Directive. Farmers have improved efficiency and productivity in order to pay modernisation costs, but it has also generated increased pressure on the demand for water, due to some farmers have increased their production as they have modernized and they have shifted to crops with a greater irrigation water demand. We can´t forget that they get into debt to pay the modernization and they need to perform higher gross margin crops, but generally with more water demand.

The modernisation costs threaten to destroy local agriculture and to create grave problems in the rural environment. In the table 1, the costs of water are the payments made to government (in respect of taxes, investment and maintenance) and payments to the irrigation communities, while the cost of irrigation is defined as all other costs associated with the activity, we can see that the cost of water represents less than 14% of the total cost, while modernisation costs account for some 66.65%, or €552.77 per hectare.

Hence, the problem for farmers is not to pay the cost of water[1], which could be doubled without much trouble, but the costs of modernisation and irrigation, which are some 5 or 6 times greater. In this framework, can farmers in the CGRAA afford modernisation? In principle, the answer is that they cannot, as average net margins in the area are around €641 per harvest and hectare. The only solution for farmers, then, has been to intensify cropping (sowing two harvests, irrigating uncultivated land and switching to more profitable but thirstier crops), which has only increased the demand for water (and hardly ever reduced it) even though this is an environmentally

[1] If inflation is zero, the State will recover 102% of its investments in water regulation works in accordance with the criteria established in the Water Act, and in line with the WFD, but it will recover only 52% of the investments associated with distribution infrastructure. This is serious, because these outlays are generally much larger. To come approximately into line with the DMA, payments to government would need to consider of inflation and increase around 2 times.

undesirable outcome. One solution to this situation would be to ensure that direct users, basically farmers, do not bear the whole cost alone, as this option would alleviate demand-side pressure.

Table 1: Annual cost of modernised irrigation in the CGRAA, 2006

	Average modernisation cost	
(A) Farmer's cost of water	**(€/ha)**	**(%)**
Payments to government	45.29	5.46
Payments to the Irrigation Community and the CGRAA	64.47	7.77
Farmer's total cost of water	*109.76*	*13.24*
(B) Cost of irrigation	**(€/ha)**	**(%)**
Labour	79.51	9.59
Modernisation of general water networks	136.65	16.48
Farm equipment	230.33	27.77
Energy costs	169.96	20.49
Farm adaptation	15.83	1.91
Sundry expenses	87.26	10.52
Total cost of irrigation	*719.54*	*86.76*
Total cost associated with the use of water (A+B)	**829.3**	**100**

Source: Own work based on de Groot (2006).

Nowadays, there is a clear consensus on the relevance of direct and indirect uses. The virtual water concept was first defined by Allan (1993) as "embodied" water in a product, it is not only the physical quantity consumed directly in the production of the product, but also the amount of water that has been necessary to consume to generate any input used for that product. For example, virtual water provides information on all the water requirements needed to produce one kilo of tomatoes. Later, Hoeskstra & Hung (2002) carried out some works to quantify the amount of virtual water trade flows and to identify countries that carry out net exports or imports of virtual water. These authors define the concept of water footprint of a country as "the volume of water needed to produce goods and services consumed by the inhabitants of that country", and they use it as an indicator of water use in relation to consumption of the population. The water footprint shows if a country is self sufficient in water.

Table 2 shows per capita direct water use and virtual water use[2] in the province of Huesca. Households consume only 161 litres/day per person, but the total per capita use of water is 26,432 litres, over 160 times direct household consumption. In addition, 6,645 litres per capita are brought from other regions of Spain or imported from other countries, and 18,134 litres, over 2/3 of the total, end up in exports, to characterize the Huesca economy as a net exporter of water. As shown in table, the largest direct user is agriculture with 17,571 litres, but only 1,178 litres end up as virtual water embodied in its products sold to households. Also, final commodities sold by

[2] In this paper, the virtual water use will be the vertically integrated use of water.

Food, beverage and tobacco or Hotels and restaurant to households have more virtual water than the final goods sold by Agriculture, although their direct uses are very small. The agro-food industry, for example, uses only 19 litres but their products sold to households that contain more than 2,000 litres virtual water.

In light of the above, and especially the case of Huesca, seems reasonable to use criteria for payments by water users that combine both direct payments and payments for intermediate or final users, although its implementation is more complex than the current payment system in Spain for direct users. This requires a serious reflection, although it is probably much fairer and more environmentally efficient. If only a part of the costs are paid by direct use, the incentive to save and modernization is maintained for the direct user, but the economic pressure on irrigators is lower, allowing more easily implement an environmental policy of conservation. On the other hand, in an arid country like Spain, payment for the virtual water embodied in exports would unquestionably favour more rational use of water and would probably reduce it. Finally, if end consumers have to pay for the virtual water embodied in the products they buy, they will also support saving and sustainability.

Table 2: Per capita virtual water use (litres/day) in Huesca (Spain)

Sectors	Use	Virtual water of Households consumption	Virtual water of Exports
Agriculture	17,571	1,178	6,384
Livestock	440	15	1,117
Energetic Products and Water	429	124	92
Food P., Beverages & Tobacco	19	2,077	5,208
Chemical Products	858	62	281
Rest of the industry	151	111	455
Construction & Engineering	6	13	0
Commercial Services	10	78	37
Hotels & Restaurants	31	1,537	25
Transport & Communications	3	18	7
Other Services	107	127	16
Soc, AA.PP., S/I	0	581	82
Households	161	161	0
Domestic total	**19,786**	**6,082**	**13,704**
Rest of Spain	4,729	1,631	3,099
European Union	1,774	532	1,242
Rest of the World	142	54	89
Total Foreign Sector	**6,645**	**2,216**	**4,429**
TOTAL (Sum)	**26,432**	**8,298**	**18,134**

Source: Cazcarro et al. (forthcoming)

In conclusion, the mixed criteria are more complex but they show a great potential to generate a greater environmental responsibility, which is the main objective of this work, and the

same situation can be applied to other environmental measures such as water pollution or air emissions.

3. Methodology.

In the following study, we shall work with a computable general equilibrium model (CGEM, Computable General Equilibrium Model), one of the typical tools for the analysis of economic policies, see Arrow (2005).

General equilibrium models capture the characteristics and the overall functioning of an economy which incorporates variables of demand and supply, and the interrelationships between different sectors of an economy, so it allows us to consider the direct and indirect effects of alternative economic policies or changes in the behaviour of the economic agents.

Since the earlier versions, two-factor and two traditional goods models carried out among others by Harberger (1962) and Shoven and Walley (1972), there have been developed numerous applications of the models general equilibrium. In particular, in recent years, they have been applied to the environment and water management. See works of Berck et al. (1991), which uses a CGE to study the reduction of the water use to solve the drainage problems in the San Joaquin Valley in California, or Dixon (1990) who analyzes the impact and efficiency of water prices for Melbourne, Sydney and Path. In the case of Spain there have been some works such as Velazquez et al. (2006), who parts of the work of André et al. (2005) and Cardenete and Sancho (2003), in order to analyze the effects of an increase in the rate of water consumed by agricultural sectors and the sector relocation, or the work done by Gomez et al. (2004) for the Balearic Islands, who simulates the water savings possible through the development of markets and the sector relocation of the resource.

In order to a CGE model can be operational is necessary to have a case base, so that the presentation of data in the initial balance is usually performed by a Social Accounting Matrix (SAM, *Social Accounting Matrix*) see Kehoe (1996), which describes all transactions that take place in an economy over a time period. For the initial implementation of this model we are going to use the SAM available in the province of Huesca for 2002.

The general equilibrium model used will be the model produced by the International Food Policy Research Institute (Lofgren et al., 2002), in which we have made some small changes to apply the model to a particular region the economy of Huesca and to our own objectives. The

model is solved with GAMS (General Algebraic Modeling System) a widely software used for this purpose documented by Brooke et al. (1988).

The model.

The model is consisted of 29 production sectors, in which two of them produce agricultural goods (irrigated and unirrigated land) and a third that represents livestock sector. It also includes two inputs (labor and capital), an account that represents household, other account for enterprise, one savings / investment account, one government account, five tax accounts (direct and indirect) and three foreign trade accounts (Rest of Spain, European Union and Rest of World). The formal characteristics can be seen in detail in Lofgren et al. (2002). Water uses data used in the model were obtained from the work of Cazcarro et al. (forthcoming).

However, the practical implementation has some peculiarities which we shall discuss. The production functions used are Leontief functions, except in one sector, Irrigated land, because in this case the use of a CES function allows us to approach easier to the improvement in efficiency generated by irrigation modernization. Nevertheless, in our model there is not home consumption, which simplifies the optimizing behaviour of households.

Another specification of the model is the kind of macroeconomic closure used. For the government balance, it is assumed that government savings is a flexible residual while all tax rates are exogenous. For the external balance, the exchange rate is fixed while foreign savings is flexible, as trade relations in the province of Huesca are made with the rest of Spain and the European Union in a common currency, the euro. And for the saving-investment balance, the total value of private savings is assumed to adjust to the investment. The government is able to implement policies that generate the necessary private savings.

Calculation of virtual water

As this has already been mentioned, the virtual water is "embodied" water in a product, and it provides information on water requirements, both for agricultural products and the rest of goods and services, it allows to know the amount of water needed to produce one kilo of wheat, meat, beer,... In addition, the virtual water provides information on virtual water flows between countries.

In order to calculate the total amount of water needed in the production of households and exporters final demand, we will use in all cases a linear model of Leontief open. And if **A** is its matrix of total technical coefficients and **c** an unit uses of water vector, the equations

$$\boldsymbol{\lambda}' = \mathbf{c}'(\mathbf{I} - \mathbf{A})^{-1} = \mathbf{c}'\mathbf{M}$$
$$\boldsymbol{\Lambda}(\mathbf{z}) = \boldsymbol{\lambda}'\mathbf{z}$$

allows us to get the vector of water values **λ**, which the embodied water in each unity of domestic commodity, and **Λ(z)** will be the valuation of **z** in terms of water.

Both at base case and in the different simulations, the a_{ij} elements of **A** will be the ratio between commodity *i* used in activity *j* and the total commodity *j* (domestic output and imports). The c_j elements of **c** are obtained by dividing direct water uses in activity *j* by total commodity *j*.

To calculate **c** we must fix also how water use is estimated for hydroelectric activities, since they are water users but they do not consume it physically although they reduce its potential energy. To do it, we assume that the hydroelectric sector has a fictitious consumption such that the payments generated would be equals to the payments currently made by generating plants. Based on the data for Huesca, this fictitious consumption is 7% of the water consumed by irrigation land. So it eliminates the need to characterize water use by a vector which collect features such as use, physical consumption, potential energy, quality,...

For imports, also for simplicity, we assume that the value of water is also obtained with the same equations, being in this case **c** the vector of unit uses of water of the Spanish economy, and **A** the total technical coefficient matrix of the Spanish economy. This hypothesis is acceptable for our purpose because the 60% of Huesca imports are sourced from the rest of Spanish regions.

In the table A.1 of Annex we can see current water uses and its coefficients, which include fictitious consumption of hydroelectric for the economy of Huesca for each sector. We can observe that all domestic uses without households or foreign sector are 1,608,323 Dm ^{3}, and if we add the water uses obtained from other regions or countries, 520,503 dm ^{3}, we obtain the total uses, 2,128,826 Dm^3. In the last two columns we can see the values of domestic water and total water (domestic and imported).

Description of scenarios

The scenarios, we are going to simulate, will involve an increase in payments for domestic water use of 40 million of euros. This is an arbitrary figure, but it is approximately the increase that would arise in the economy of Huesca if water payments to government were doubled, and if these payments also included payments for the modernisation of general water networks and 50% of energy costs, which are currently paid by farmers, see table 1 and at the foot note 1. Therefore, we can indentify these payments with the annual cost to modernize all irrigated land of Huesca. These are the scenarios:

Scenario 1: Distribution of payments similar to the current situation. Direct users pay according to the quantity used weighted by some weights obtained by negotiation between the

direct users. The payments are distributed between irrigated agriculture with 70.03%, industry-services with 12.45% and hydroelectric plants with 17.53%, according to data from the 2002 CGRAA.

Scenario 2: Payment by direct users in proportion to their use of water without corrective weightings.

Scenario 3: Payment by exporters only in proportion to the virtual water embodied in exports.

Scenario 4: Payment only of a levy on final consumption in proportion to the virtual water embodied in the product.

Scenario 5: Mixed payment criterion, in which 1/3 is paid by direct users based on the water used, and 2/3 by exporters and consumers in proportion to the virtual water embodied in products.

The increase in payments, when it is not done by exporters, is introduced in all scenarios as an increase in the indirect tax on activities (*ACTTAX*).

In scenario 3, it is paid only by exporters in proportion to the virtual water exports, the payments were introduced as an export tax. In the case of scenario 5, we combine these two types of payment.

4. Effects of modernisation without improvement in productivity.

In order to observe the effects of modernisation we suppose that government has made and financed all modernization works initially. Also it collects 40 million of euros a year, and it earmarks them to pay for the modernisation works (construction sector) and the energy costs. Then, we will get closer to effects in two turns, at the first we will assume that farmers improve efficiency water use by 10%, but they don´t improve the productivity. It will show us the changes in prices and production and how modernisation costs influence. Subsequently we assume that farmers react to the increase of costs and they improve the productivity. In both turns we pay attention in savings water. Now, we are going to see the results in the first case.

Scenario 1

In this scenario, the criteria for allocating payments are the current, corresponding percentages of 70.03%, 12.45% and 17.53% for irrigated agriculture, industries-services and hydroelectric. The increases in payments by modernisation can be seen in table A.2. In it we can

observe the effects on price changes, which in the calibration model are unitary for all accounts and also, variations in domestic output, exports and imports.

Payments in this scenario are made basically by four users, namely Irrigated land, Energy products, Chemicals and Livestock, which account for over 97%. As a consequence, the accounts with the largest price rise in percentage terms include Irrigated land (11.24%), Energy products (4.33%), Livestock (1.09%) and Food, beverages and tobacco (3.28%). The latter also forms part of these accounts because it is very dependent on Irrigated land and Livestock.

The domestic ouput decreases mainly in the accounts with greater price rise, except Energy products that increase their production due to the increase in consumption associated with modernization (a part is paid by Government). The price of exports and imports don´t change and the exchange rate is fixed, so that changes in exports and imports are determined mainly by changes in domestic prices. The accounts with highest payments increase their prices and reduce their exports, and also, reduce the imports due to a lower capacity to pay abroad, although it is a lesser percentage than the decrease in exports because imports have become relatively cheaper. Again Energy products is the exception, it increases its imports due to the increase in the demand in this account after the modernization and its foreign dependence. Other accounts that just increase their payments and whose prices fall, as Transport material, Recoveries and repairs, Hotels and restaurants, Retailing and Paper, stationery and printing, increase their domestic production and exports and imports.

Effects compared in the five scenarios.

In all cases, payments represent revenues for Government, but their distribution and tax nature differs in each scenario. In scenario 2, as already mentioned, the direct users pay in proportion to their use of water without corrective weightings, unlike the scenario 1. The breakdown of payments is very similar to scenario 1, so that the weights of individual users have a little effect. As shown in table A.3 in Annex A, the four accounts that pay the most are the same, and they are ranked in the same order: Irrigated land, Energy products, Chemicals and Livestock, and these accounts represent 97.30% of payments in scenario 1 and 97.56% in scenario 2. The main effect of removing the weightings is to transfer a little over half of the payments made by Energy products to Irrigated land, as in scenario 2 irrigated land accounts has 83.61% of all payments while in scenario 1 is 70.03%, and Energy products account goes from almost 20% of total payments in the scenario 1 to decrease to 8% in Scenario 2.

In scenario 3, pay only exporting virtual water in proportion to their exports, with export taxes related to the value of exported water. The accounts that pay the most are Irrigated land and

Food, beverages and tobacco with 41.87% and 40.19% of the total. Note the high percentage of Food, beverages and tobacco due to its high virtual water, valuation while in the preceding scenarios represented less than 0.2%. By contrast, 41.82% of payments are made by Irrigated land, compared to its payments of 70.03% and 83.61% in scenarios 1 and 2.

In scenario 4, the payment is made by virtual water of final consumption. In table A.3 the first positions surprise, Food, beverages and tobacco and Hostels and restaurants, with 40.53% and 28.47% of the payments, respectively, due to the significant share of products from these sectors in household spending and to their embodied water value. In scenario 3, Hotels and restaurants had a little participation because of small relevance of their exports. Irrigated land is placed the third with 15.58% of payments, but this is still far from its percentages in scenarios 1 and 2. It is followed by Energy products, which pays 6.83%, near to the percentage in scenario 2 but less than half that of its payments in scenario 1.

On scenario 5, the criterion for payment as mentioned earlier is mixed, in which 1/3 is paid by direct users based on the water used, and 2/3 by exporters and consumers in proportion to the virtual water embodied in products. The ranking here is a combination of the preceding scenarios, and it is determined by the percentage of payment assigned to direct uses. The highest paying accounts in descending order are: Irrigated land, Food, beverages and tobacco, Hotels and restaurants, Energy products and Livestock. Irrigated land is ranked first due to its share in scenarios 2 and 3. Meanwhile, Food, beverages and tobacco comes second because of the high valuation of virtual water, as a result of which it ranked second and first in scenarios 3 and 4. Likewise, the positions occupied by Hotels and restaurants and Energy products may be understood in light of their significance in scenarios 2 and 3.

We may conclude, therefore, that the payment criterion selected is a relevant economic and environmental issue, since the payment distribution varies significantly. This is confirmed in table A.4 in Annex, which presents changes in prices in different scenarios.

Differences between scenarios are again apparent. In scenarios 2, accounts with the highest increase in prices, in percentage, are Irrigated land (13.58%), Food, beverages and tobacco (3.90%), Livestock (1.20%) and Energy products (0.82%), the same as we observed in scenario 1, with changes very similar except for Energy products. In scenario 3, the four accounts with the largest increase in prices are Irrigated land (5.36%), Food, beverages and tobacco (3.97%), Livestock (2.15%) and Wood, cork and wooden furniture (1.10%), and the first three are also those with more payments. In contrast, Energy products, the next highest in terms of payments, now has positions very low in the ranking, even it shows a slight decrease in prices. In scenario 4, the sectors with the highest increase in prices were also those that ranked highest in terms of

payments, Food, beverages and tobacco (2.28%), Irrigated land (1.75%), Hotels and restaurants (1.36%) and Energy products (0.51%), although the increases are lower than in previous scenarios. Finally, if we look at the changes in prices in the mixed scenario, the accounts with the highest price rise as a combination of the preceding scenarios are: Irrigated land (7.19%), Food, beverages and tobacco (3.59%), and smaller percentages in Livestock (1.26%) and Wood, cork and wooden furniture (0.70%).

Similarly, if we look at the variation in domestic output, in table A.5, we can observe the positive correlation between price increases and reductions in domestic production in all scenarios, as it was in scenario 1, with the anomaly of Energy products for the reasons already mentioned.

In relation to foreign trade in tables A.6 and A.7, we can observe the changes in exports and imports in thousands of euros and in percentages. Scenarios 1 and 2 have similar changes, the accounts Irrigated land, Livestock and Food, beverages and tobacco with highest increase in prices, reduce the export quantity in both scenarios. These accounts also reduce their imports, although to a lesser extent, due to declining purchasing power.

In scenario 3, again the exports are reduced in the five accounts with highest increase in payments, it becomes more pronounced than in other scenarios. In turn, these accounts reduce their purchasing power and their imports. In scenario 4, the reduction in exports in Irrigated land, Livestock and Food, beverages and tobacco are smaller than in previous scenarios, while imports reduce more or less depending on the sector. In the mixed scenario, as a combination of the other scenarios, exports fall a lot of in the accounts of Irrigated land, Unirrigated land, Livestock, Chemicals and Food, beverages and tobacco, the most affected by foreign trade.

In conclusion, we can say that payment for virtual water is always less inflationary (it impacts less in prices) than payment for direct use, especially if it is associated with final consumption, like in scenario 4; the effects in domestic output are similar; and foreign trade have more effects in scenario 3, because modernisation is only paid by exporters.

5. Water savings.

As in the previous section we assume that farmers, although they have improved the efficiency in water use, they have not any improvement in productivity because they go on with the same production technology and the same crops. In this framework, we are going to estimate water savings and the changes in the flows between sectors and in the trade flows.

We suppose that the water efficiency improves and imports vary, then the water values will be different to the initial water values, and mainly the changes will be due to a reduction in the water use coefficient in Irrigated land, which will be reduced to 90% of its initial value in the simulation. These values allow us to know the virtual water embodied in consumption of households and exports, and unlike initial values the savings that they are caused by modernisation. The results are in tables A.8 and A.9 in Annex. The first one includes only the internal uses of water, which are the most relevant for water management policy, and the second one includes all uses, domestic and imported.

The first result obtained from table A. 8 is that it is generated significant water savings via reduction of exports in all of the scenarios, these reductions are due to payments for modernisation and to increase in prices. In all scenarios, savings water are above 8.03%, and in scenario 3, they reach 14.59%. The meaning of these numbers is easier if we think that a 10% reduction in water use irrigation coefficient that we have assumed, according to table A.1 data, mean a reduction in total domestic uses near 8.43%.

On the contrary, domestic uses for households consumption tend to increase with the modernisation, except to scenario 4. However, the increases in uses in households are compensated in all cases by export savings, see table A.16. In all scenarios there are water savings on the whole and they are above 8% and below 10%, scenario 2 and 3 are the thriftiest. In other words, technological saving generated by modernisation is remained in all scenarios and additional saving via changes in households and exporters is not much significant.

In table A.8 we can observe that water savings in exports are mainly generated by reductions in the demands of the accounts of Irrigated land, Energy products, Food, beverages and tobacco, Livestock and Unirrigated land, while increases uses are due mainly to the accounts of Metal products and Machinery, Transport material, Paper, stationery and printing and certain industrial and service sectors. Therefore, water saving volume via reduction of exports is related to increases in prices of different accounts, but it is also influenced by water values and its elasticity. At the same time, if we observe households, the increases in water uses, except scenario 4, are mainly in the accounts of Food, beverages and tobacco, Hotels and restaurants, Irrigated land, Chemicals and Retailing.

On comparison, the savings in scenarios 1 and 2 are very similar, both figures and accounting distribution, it confirms that the weightings currently used to differentiate between direct users have a little influence. Scenario 2, which does not discriminate in weights, has lightly higher savings than scenario 1, 9.98% versus 9.73%, because it has higher increases in prices than scenario 1, see table A.4.

On the other hand, without improvement in productivity scenario 3 is the thriftiest, especially for its water savings via exports. Nevertheless, global savings of scenario 2, 3 and 4 are similar and, as we will observe, when there is an improvement in productivity, scenario 3 is not the thriftiest.

So far we have talked of domestic water, without thinking of the virtual water flow associated with imports, which is approximately 25% of total uses. Also part of this water is exported. To fill this gap, first we shall consider how the inclusion of imports influences the conclusions obtained from previous table using table A.9, similar to table A.8 except that water values used for the calculations are total, including virtual water imports. Comparing the two, we find that the total figures presented in table A.9 are higher than table A.8, and the same in percentage. On the contrary, the percentages of water savings via exports are smaller, although the figures in Dm^3 can be bigger. It means that if we add household consumption and exports, the savings are now smaller in percentage than when we consider domestic and import uses. It supposes that water uses imported in general, increase with the modernisation. It can be seen in table A.9 for four scenarios, and it is what we expected, because when a domestic good puts up the price, there is a clear tendency to increase imports. However, in scenario 4 because of its distinctive features, it needs a detailed study.

6. Reactions after the increase in productivity of irrigation system.

We have assumed in the two preceding paragraphs that there was not technological change in agricultural production, but that is unrealistic although it has allowed us to see the isolated effects of the payments of modernization. According to the CGRAA data that we use as a reference, modernisation implies the crop intensification and changes in the types of crops, it allows a greater profitability. In order to incorporate in simulations these improvements in productivity of Irrigated land we will change the parameter of efficiency of the CES function in Irrigated land. As the improvement in efficiency depends on many factors, the preparation of farmers, agricultural research, product marketing, etc., we will analyze the problem for three different levels of improvement, and we will seek in special qualitative information. In tables A.10, A.11, A.12 and A.13, we can observe the effects on prices, output and foreign trade in all scenarios as a result of improvement in productivity by 5%, 10% and 15% in the CES function of Irrigated land, while the

other accounts go on with a Leontief production function without technological change[3]. Data, compared with we obtained previously, are those expected from an improvement in productivity of Irrigated land.

Table A.10 shows us that when the productivity of Irrigated land increases after the modernization, increases in prices of Irrigated land are lower in all scenarios, and even they fall. It is the same in the accounts of Livestock, Unirrigated land, and Food, beverages and tobacco, because of its relationship and dependence on agricultural products. In particular, scenarios 3 and 4, with payment associated with virtual water, in all levels prices tends to increase low or fall in a greater proportion, it shows that, as without improvement in productivity, the effects of inflation in these scenarios are lower than in other.

In table A.11 we can observe that in all scenarios when productivity of Irrigated land increase, output falls less or increase in the account of Irrigated land and in the accounts which depend on it, for example, Livestock, Unirrigated land and Food, beverages and tobacco.

In tables A.12 and A.13 we can see the changes in exports and imports. In all scenarios, when productivity increases, the decrease in the exports in agricultural accounts is lower, and exports increase when productivity increases of 15%, except scenario 3 and 5 due to the influence of the export tax. As for imports, in all scenarios when productivity of Irrigated land increases, the imports of agricultural accounts decrease less and less. On the contrary, effects in the improvement in industrial accounts are different and they have not a secure trend, because productivity of Irrigated land only influence them lightly, see Energy products, Chemicals and Paper, stationery and printing.

We have seen the effects in all scenarios after an increase in the productivity of Irrigated land, now we can analyze how the improvement in productivity of Irrigated land influences in levels of water savings and water use. In tables A.14 and A.15, we can observe the variation in the domestic water use in Dm^3 due to changes in the productivity of Irrigated land when the productivity of irrigation increases by 10% and 15%, and in the table A.16, we compare percentage of total changes in the case of domestic water.

Table A.16 allows us to see some changes in trends as a result of an improvement in productivity. On the one hand, water savings via exports are reduced in all scenarios because of a higher productivity encourages to increasing the output and the exports, and it generates less water savings. It can be seen by 15% of improvement in productivity, in all scenarios water savings is

[3] CES technology is used for the account Irrigated land as it allows changes in productivity with greater ease. Also changes have been made with Leontief technology for the account Irrigated land, obtaining qualitatively similar results.

lower than 8.00%, and in scenario 3 it is by 7.99%, which was by 14.59% when there was not improvement in productivity.

In the case of households, the trend with the improvement in productivity is opposed to exports, uses are reduced and all scenarios save water by 15% of improvement. However, water savings via households are very different, by 15% of improvement they vary between 0.27% in scenario 3 and 9.26% in scenario. The variability proves the importance of the criteria for payment when we want to draw environmental polices up about water uses.

If we consider both of households and exports, all of scenarios go on having water savings by 15%, between 6.24% and 9.15%. They are slightly smaller than water saving without an improvement in productivity. It means that if productivity of Irrigated land with modernisation increases, water savings are small because production is going to increase.

Now, we will observe in detail scenario to scenario. If we look at the scenario 1 and 2, tables A.14 and A.15 show us that they are quite similar, although scenario 1 saves less mainly via exports. In the same tendency, when the productivity of Irrigated land increases, water savings generated via exports decrease while water savings generated via households increase. By 15%, the sectors which are the thriftiest via exports are Food, beverages and tobacco, Livestock and Energy Products. And via consumption, the thriftiest sectors are Food, beverages and tobacco, Hotels and restaurants, Irrigated land and Energy products.

Scenario 3, with payment for virtual water exporters, is the thriftiest via exports as it was expected for three levels of productivity increase by 0%, 10% y 15%. And it is the scenario with the most increase in demands, via households, in the three cases, but they are smaller if productivity increases with water saving by 0.27% by 15% of productivity.

Scenario 4, with payment for virtual water by end users, is the scenario the thriftiest via households, as it was in the case without improvement in productivity. However, via export it is the scenario with less water savings or more increase in the water demand, and it increases by 0.11% by 10% of productivity

Finally, in the mixed scenario we can observe the general tendency, water savings fall with improvement in productivity via exports and increase via households, mainly due to the accounts of Irrigated land and Food, beverages and tobacco, Hotels and restaurants and Livestock.

7. Conclusions and final remarks.

This work analyze water situation of the province of Huesca, situated in north-east Spain, where the modernisation of agriculture has resulted in a significant increase in water use and water

pollution. In this region, just like the rest of the country, water uses for some scientific are close to the maximum sustainable, and in many cases have gone beyond it, what it is very worrying because of arid climate in a great part of the country.

This process has caused an important debate and some new water supply policies, as for example modernisation of Irrigated land. According to European Water Framework Directive and recent Spanish legislation, cost of this modernisation should be paid in a great part by direct users, in other words farmers. In table 1 we can see annual cost of modernisation for the Upper Aragon General Irrigation Community (CGRAA), an irrigation system who has 2/3 more or less of Irrigated land in Huesca and which we have used as referent. High costs are very difficult to be borne by the farmers. Their response is resulting in the closure of farms or in the crop intensification, which increases water pressure.

On the other hand, environmental benefits of modernisation are not only for farmers but all society. Also Irrigated land as we can see in table 2 generates incomes for farmers as well as it is needed to obtain a lot of export goods and their incomes. Many people argue that it would be rational for responsibility of modernisation costs to be borne by all direct and indirect beneficiaries of agriculture, including agro-food businesses, or final consumers, as households and exporters. As a result, a distribution of water payments among users of all kinds, directs or no, is suggested. It would be in line with the open debate, in relation with emissions, about responsibility distribution between users and between countries.

In this study, we suppose that Government carries out the modernisation of Irrigated land in Huesca and it recovers the cost with an annual payment for users of 40 millions of euros, this payment allow it to cover, according to data CGRAA, the cost of modernisation of Irrigated land and a part of energy costs. We have analyzed what happen if this payment is made with 5 different criterions between users. In two of them, scenarios 1 and 2, payment would be maintain exclusively for direct uses. In scenario 3, exporters pay only. In scenario 4, households are the only one who pay. And scenario 5 is a mixed of scenarios 2, 3 and 4. All of scenarios are studied in two different situations in the first we suppose that payment have realized and farmers improve by 10% efficiency of water use, it allow us to see payment effects and possible water savings as a result of changes in prices. In the second, as well as this efficiency, farmers improve their productivity and we can observe its important role in final water savings.

Although we have commented some results of the simulations, now we are going to mark the results more relevant. The most important thing is that type of criteria does not secondary, and it seems to have a macroeconomic and social importance.

The payments of farmers in scenarios 3, 4 and 5 would be smaller than scenarios 1 and 2, and it would increase the viability of current farms in Irrigated land and it would be reduce the pressure that modernisation is generating on water demand.

On the other hand, scenarios 3 and 4 are less inflationary and they have a less distortion in prices, what is an important macroeconomic advantage.

The payments modernisation changes the prices see table A.4, but these changes depend on the distribution criteria. Irrigated land, Livestock, Energy products and Food, beverages and tobacco have the biggest increases in prices in scenarios 1 and 2. However in scenario 3, Energy products reduce their price and the fourth position in increase is Wood, cork and wooden furniture. Finally, in scenario 4 Energy products disappears and Hotels and restaurants appears.

Others important effects on modernisation are the effect on production and foreign trade. In table A.8 we can see how production changes when there is not improvement in productivity, therefore there is an environmental improvement for the efficient water use but it is not a technological transformation in production. In this framework, productions of the sectors connected to agriculture fall for the payments because their costs increase. First the accounts with biggest falls in percentage are the same in the five scenarios, although percentages change. They are Irrigated land, Unirrigated land, Livestock, Water and Food, beverages and tobacco.

These falls are also in levels of exports, as we can see in table A.6, without improvement in productivity. The fourth positions in more percentage fall are Irrigated land, Unirrigated land, Livestock and Food, beverages and tobacco, but the falls depend on criterion payment. In scenario 3 the falls are higher because payments are paid by exporters. In scenario 4 they are smaller, because households pay. We can see also in this table that Chemicals reduce their exports in scenario 1, 2 and 3 but not in scenario 4.

Previous results change if we incorporate an improvement in productivity, which accompanies each process of modernisation of Irrigated land. In tables A.10, A.11, A.12 and A.13 we have any information about prices, outputs and foreign trade, and it is in figures for three levels of different improvement, by 5%, 10% and 15%.

In relation with the prices, the trend is the reduction of the prices associated with goods connected direct or indirect to agriculture, because they receive the improvement in productivity of Irrigated land direct or indirectly. This reduction leads to the increases are cancelled, and with improvement by 15% they can be smaller than in the previous situation to the modernisation. For example we can observe the case of Irrigated land, Unirrigated land or Food, beverages and tobacco.

Something similar is with production and exports, goods associated with Irrigated land are less expensive and therefore they increase their demand because of the improvement in productivity. These falls caused without improvement in productivity disappear or they are reduced as we can see in the corresponding tables.

We have seen the effects since an economic point, but now we will see how modernisation influences in the environmental, in other words, in water uses. In tables A.8 and A.9 we can observe water demand in all scenarios without improvement in productivity. In tables A.14 and A.15, the results are with improvement in productivity by 10% and 15%. And finally in table A.16, figures for the whole economy are collected. We would not forget that all figures are values in virtual water, it is water demanded direct or indirectly to obtain the product. And we can also distinguish between virtual water in exports and virtual water in household consumption.

As we can see in table A.16, the saver characteristic or no is very different in exports and in households. If we notice in the case by 0% of improvement in productivity, all scenarios are water saving via exports, but on the contrary, except to scenario 4, water demand increases via households.

This previous conclusion is valid for other levels of productivity, because when productivity increase, water savings decrease via exports but increase via households. They move in the opposite direction. Scenario 3 is always via exports the thriftiest and scenario 4 is the less thrifty via households.

Table A.16 allow us to see water savings on the whole. It surprises because they are not more different in the different situations and scenarios. They vary between 6.24% and 10.0% of water uses. Actually, in all of cases they are about 8.5% that it is more or less the technological saving induced by modernisation. The figures should be in relation with this average figure, when water saving will be superior (inferior), it will mean that with an adjustment via agents, modernisation saving is reinforced (reduced).

We finish with a few words about imported water. It is approximately by 25% total water use see table A.1. Nevertheless, previous remarks do not change significant if we consider total uses, domestic and imported, comparing tables A.8 and A.9. However, it is required an intensive and careful study to confirm it, which we do not.

8. Bibliography.

Allan, J. A. (1993): “Fortunately there are substitutes for water otherwise our hydro-political futures would be impossible”. *ODA, Priorities for Water Resources Allocation and*

Management: 13-26.

André, F.J., Cardenete, M. A. y Velázquez, E., (2005): "Performing an Environmental Tax Reform in a Regional Economy. A Computable General Equilibrium Approach", *Annals of Regional Science*, 39, 375-392.

Arrow, Kenneth J. (2005), "Personal Reflections on Applied General Equilibrium Models" in Kehoe et al. (2005), "Frontiers in Applied General Equilibrium Modeling", *Cambridge University Press*.

Ballard, C.L., Fullerton, D., Shoven, J.B., y Whalley, J., (1985): "A General Equilibrium Model for Tax Policy Evaluation", *University Chicago Press*, Chicago.

Berck, Peter, Robinson, Sherman, & Goldman, George E. (1990): "The use of computable general equilibrium models to assess water policies". UC Berkeley: Department of Agricultural and Resource Economics, UCB. CUDARE Working Paper No. 545.

Brooke, A., Kendrick, D. y Meeraus, A. (1988): "GAMS. A User's Guide". *The Scientific Press*

Cadarso, María Ángeles; López, Luis Antonio; Gómez, Nuria; Tobarra, María Ángeles; Zafrilla, Jorge Enrique (2009): "Comercio internacional y responsabilidad medioambiental compartida en la economía española". Universidad de Castilla La Mancha.

Cazcarro, I.; Duarte, R.; Sánchez Chóliz, J. (forthcoming): "Water consumption based on a disaggregated Social Accounting Matrix of Huesca (Spain)". *Journal of Industrial Ecology.*

Del Campo García, Andrés: (1996) "Las Comunidades de Regantes en España y su Federación Nacional". XIV Congreso Nacional de Riegos. Aguadulce (Almería), Junio de 1996.

Dixon, P.B., (1990): "A general equilibrium approach to public utility pricing: determining prices for a water authority". Journal of Policy Modelling, 12 (4): 745-767.

Gómez, C.M., Tirado, D., Rey-Maquiera, J., (2004): "Water exchanges versus water Works: Insights from a computable general equilibrium model for the Balearic Islands" *Water Resources Research*, 40 (10).

Groot, E. (2006): "Valoración financiera de los costes asociados al uso de agua de riego: el caso de Riegos del Alto Aragón (RAA)". *Tesis del Master* en Economía. Universidad de Zaragoza.

Harberger, A.C. (1962): "The Incidence of the Corporate Income Tax", *Journal of Policy Economy*, 70, 215-240.

Hoekstra, A. Y.; Hung, P.Q. (2002): "Virtual water trade: a quantification of virtual water flows between nations in relation to international crop trade". *Value of Water Research Report Series,* 11.

Johansen, L., (1960): "A *multi-sectoral* study of economic growth. Amsterdam: North-Holland.

Kehoe, T. J. (1996). Social Accounting Matrices and Applied General Equilibrium Models. *Federal Reserve Bank of Minneapolis Working Paper* 563

Lofgren, H.; Lee Harris, R.; Robinson, S. (2002): "A Standard Computable General Equilibrium (CGE) Model in GAMS". *Internacional Food Policy Research Institute*. Washington D.C., USA.

Munksgaard, J y Pedersen, K. (2001): "CO_2 accounts for open economies: producer or consumer responsibility?" *Energy Policy*, 29, 327-334.

Shoven, J. B. y Whalley, J. (1972): "A General Equilibrium Calculation of the Effects of Differential Taxation of Income from Capital in the U.S", *Journal of Public Economics*, 1, 281-321.

Shoven, J. B. y Whalley, J. (1992): "Applying General Equilibrium", *Cambridge Univ. Press.* Nueva York.

Peters, G. P. and Hertwich, E. G. (2006): "Pollution embodied in trade: the Norwegian case", *Global Environmental Change*, 16, 379-389.

Velázquez, E., Cardenete, M. A. y Hewings, G.J.D., (2006): "Precio del agua y relocalización sectorial del recurso en la economía andaluza. Una aproximación desde un modelo de equilibrio general aplicado." *Estudios de Economía Aplicada*, 24-3.

9. Annex A:

Table A.1: Water uses and water values in Huesca (Spain) in Dm^3.

Sectors	Domestic Use	Domestic use coefficient	Domestic Use + Imports	Imports coefficient	Total use coefficient	Domestic water values	Total Water values
Irrigated land	1,355,069	3,585	114,609	303	3,888	3,869	4,243
Unirrigated land	0	0	113,124	568	568	138	794
Livestock	33,921	82	35,609	86	168	359	533
Energy products	126,077	589	28,362	133	722	692	850
Water	1,839	362	0	0	362	435	457
Minerals and metals	100	5	576	29	34	40	82
Minerals and non-metal products	230	1	3,269	14	15	32	59
Chemicals	66,160	60	38,144	35	94	99	151
Metal products and machinery	1,058	1	13,825	12	13	18	41
Transport material	47	1	469	6	7	25	47
Food, beverages and tobacco	1,468	1	154,262	108	109	701	957
Textiles, leather and footwear	36	0	5,084	35	36	45	103
Paper, stationery and printing	752	6	3,034	23	28	106	166
Wood, cork and wooden furniture	89	2	1,251	23	24	254	327
Rubber, plastics and other manufactures	9,307	43	3,302	15	58	85	122
Construction and engineering	494	0	10	0	0	41	56
Recoveries and repairs	16	8	25	13	22	22	45
Retailing	743	1	1,089	1	2	23	32
Hotels and restaurants	2,404	4	1,291	2	7	261	345
Transport and communications	242	1	1,298	3	4	31	44
Banking and insurance	63	0	37	0	0	21	29
Real estate	88	0	41	0	0	16	21
Private education	71	2	0	0	2	39	51
Private healthcare	304	4	0	0	4	49	66
Other sales services	777	1	1,792	3	4	22	34
Domestic service	0	0	0	0	0	0	0
Public education	126	2	0	0	2	19	24
Public healthcare	544	2	0	0	2	44	61
Public services	6,297	14	0	0	14	57	68
Total production without households or external sector	1,608,323		520,503		2,128,826		

**Values per million euros.*

Table A. 2: Effects in scenario 1 without improvement in productivity of Irrigated land.

Sectors	Payment (thousands of €)	%	% Δ P	% Production (QQ)	% Exportss (QE)	% Imports (QM)
Irrigated land	28010	70.03	11.24	-13.59	-36.80	-5.90
Unirrigated land	0	0.00	0.06	-11.78	-12.23	-11.74
Livestock	988	2.47	1.09	-14.23	-18.69	-13.48
Energy products	7921	19.80	4.33	6.73	-7.39	10.41
Water	54	0.14	0.44	-10.74	-11.37	0.00
Minerals and metals	3	0.01	-0.64	3.71	5.86	3.17
Minerals and non-metal products	7	0.02	-0.45	2.97	4.76	2.60
Chemicals	1928	4.82	0.16	-3.23	-4.22	-3.11
Metal products and machinery	31	0.08	-0.64	4.72	9.18	4.18
Transport material	1	0.00	-2.05	7.30	26.23	5.53
Food, beverages and tobacco	43	0.11	3.28	-6.73	-18.88	-4.30
Textiles, leather and footwear	1	0.00	-0.14	3.65	4.37	3.53
Paper, stationery and printing	22	0.06	-0.76	1.10	7.11	0.49
Wood, cork and wooden furniture	3	0.01	0.84	1.17	-3.46	1.85
Rubber, plastics and other manufactures	271	0.68	-0.15	2.27	2.89	2.15
Construction and engineering	14	0.04	-0.67	3.26	4.38	2.71
Recoveries and repairs	0	0.00	-0.50	6.86	13.83	6.43
Retailing	22	0.06	-1.71	1.97	5.44	0.57
Hotels and restaurants	70	0.18	-0.18	3.41	3.72	3.26
Transport and communications	7	0.02	-0.97	-0.16	1.87	-0.94
Banking and insurance	2	0.01	0.21	1.51	1.16	1.68
Real estate	3	0.01	-2.07	3.85	7.54	2.12
Private education	2	0.01	0.02	1.62	1.59	0.00
Private healthcare	9	0.02	-0.74	1.93	3.15	0.00
Other sales services	23	0.06	-0.63	1.01	2.45	0.49
Domestic service	0	0.00	0.66	3.22	2.14	0.00
Public education	4	0.01	0.24	0.09	-0.29	0.00
Public healthcare	16	0.04	0.23	0.14	-0.23	0.00
Public services	184	0.46	0.07	0.03	-0.08	0.00
Total	*40,000*	*100.00*				

Table A.3: Distribution of payments (thousands of euros) in the five scenarios.

Sectors	Scenario 1	%	Scenario 2	%	Scenario 3	%	Scenario 4	%	Scenario 5	%
Irrigated land	28,010	70.03	33,443	83.61	16,744	41.86	6,233	15.58	20,196	50.49
Unirrigated land	0	0.00	0	0.00	390	0.97	199	0.50	221	0.55
Livestock	988	2.47	837	2.09	3,190	7.98	100	0.25	1,784	4.46
Energy products	7,921	19.80	3,112	7.78	1,026	2.56	2,732	6.83	2,064	5.16
Water	54	0.13	45	0.11	3	0.01	48	0.12	26	0.06
Minerals and metals	3	0.01	2	0.01	6	0.02	0	0.00	4	0.01
Minerals and non-metal products	7	0.02	6	0.01	69	0.17	5	0.01	35	0.09
Chemicals	1,928	4.82	1,633	4.08	883	2.21	541	1.35	1,064	2.66
Metal products and machinery	31	0.08	26	0.07	346	0.86	44	0.11	179	0.45
Transport material	1	0.00	1	0.00	50	0.12	21	0.05	28	0.07
Food, beverages and tobacco	43	0.11	36	0.09	16,074	40.18	16,213	40.53	10,756	26.89
Textiles, leather and footwear	1	0.00	1	0.00	71	0.18	246	0.61	83	0.21
Paper, stationery and printing	22	0.05	19	0.05	298	0.74	124	0.31	170	0.42
Wood, cork and wooden furniture	3	0.01	2	0.01	261	0.65	18	0.04	126	0.31
Rubber, plastics and other manufactures	271	0.68	230	0.57	295	0.74	255	0.64	265	0.66
Construction and engineering	14	0.04	12	0.03	1	0.00	150	0.38	35	0.09
Recoveries and repairs	0	0.00	0	0.00	1	0.00	0	0.00	0	0.00
Retailing	22	0.05	18	0.05	132	0.33	637	1.59	196	0.49
Hotels and restaurants	70	0.18	59	0.15	80	0.20	11,386	28.47	2,347	5.87
Transport and communications	7	0.02	6	0.01	33	0.08	206	0.51	59	0.15
Banking and insurance	2	0.00	2	0.00	2	0.01	77	0.19	17	0.04
Real estate	3	0.01	2	0.01	9	0.02	285	0.71	62	0.16
Private education	2	0.01	2	0.00	1	0.00	48	0.12	11	0.03
Private healthcare	9	0.02	8	0.02	2	0.01	201	0.50	44	0.11
Other sales services	23	0.06	19	0.05	32	0.08	171	0.43	56	0.14
Domestic service	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Public education	4	0.01	3	0.01	0	0.00	4	0.01	2	0.00
Public healthcare	16	0.04	13	0.03	1	0.00	36	0.09	12	0.03
Public services	184	0.46	155	0.39	0	0.00	18	0.05	56	0.14
Labour	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Companies	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Saving / Investment	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Households	363	0.91	307	0.77	0	0.00	0	0.00	102	0.26
Spain	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
European Union	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Rest of world	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total	40,000	100	40,000	100	40,000	100	40,000	100	40,000	100

Table A.4: Percentage increase in prices without improvement in productivity of Irrigated land.

Sectors	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Irrigated land	11.24	13.58	5.36	1.75	7.19
Unirrigated land	0.06	0.11	0.58	-0.22	0.27
Livestock	1.09	1.20	2.15	-0.82	1.26
Energy products	4.33	0.82	-0.48	0.51	0.15
Water	0.44	-0.03	-0.91	-0.13	-0.45
Minerals and metals	-0.64	-0.82	-0.76	-0.95	-0.81
Minerals and non-metal products	-0.45	-0.61	-0.57	-0.74	-0.61
Chemicals	0.16	0.03	-0.11	-0.23	-0.08
Metal products and machinery	-0.64	-0.71	-0.62	-0.94	-0.70
Transport material	-2.05	-2.29	-1.75	-2.85	-2.11
Food, beverages and tobacco	3.28	3.90	3.97	2.28	3.59
Textiles, leather and footwear	-0.14	-0.13	-0.07	-0.08	-0.08
Paper, stationery and printing	-0.76	-0.88	-0.51	-1.47	-0.81
Wood, cork and wooden furniture	0.84	0.98	1.10	-0.73	0.70
Rubber, plastics and other manufactures	-0.15	-0.28	-0.25	-0.55	-0.31
Construction and engineering	-0.67	-0.72	-0.70	-0.91	-0.74
Recoveries and repairs	-0.50	-0.57	-0.49	-0.74	-0.56
Retailing	-1.71	-1.86	-1.63	-1.81	-1.73
Hotels and restaurants	-0.18	-0.08	0.01	1.36	0.25
Transport and communications	-0.97	-1.12	-1.04	-1.16	-1.08
Banking and insurance	0.21	0.29	0.15	0.10	0.19
Real estate	-2.07	-2.19	-1.92	-2.11	-2.04
Private education	0.02	0.09	-0.01	0.02	0.04
Private healthcare	-0.74	-0.79	-0.75	-0.70	-0.74
Other sales services	-0.63	-0.67	-0.63	-0.75	-0.66
Domestic service	0.66	0.86	0.63	0.46	0.68
Public education	0.24	0.36	0.21	0.05	0.23
Public healthcare	0.23	0.30	0.15	-0.01	0.17
Public services	0.07	0.15	-0.02	-0.20	0.01

Table A.5: Changes in production (in %) without improvement in productivity of Irrigated land.

Sectors	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Irrigated land	-13.59	-15.82	-16.18	-11.13	-15.03
Unirrigated land	-11.78	-13.76	-14.69	-9.97	-13.42
Livestock	-14.23	-16.57	-17.43	-12.22	-16.07
Energy products	6.73	8.10	0.63	7.48	4.52
Water	-10.74	-12.32	-10.84	-7.29	-10.69
Minerals and metals	3.71	4.19	1.80	4.16	3.06
Minerals and non-metal products	2.97	3.08	0.90	2.58	1.98
Chemicals	-3.23	-3.46	-3.62	-0.82	-3.06
Metal products and machinery	4.72	5.27	3.84	6.61	4.78
Transport material	7.30	8.22	9.32	6.00	8.25
Food, beverages and tobacco	-6.73	-7.91	-6.63	-7.03	-7.10
Textiles, leather and footwear	3.65	4.03	7.37	-1.03	4.68
Paper, stationery and printing	1.10	1.24	1.52	1.14	1.37
Wood, cork and wooden furniture	1.17	1.19	-0.51	3.68	0.84
Rubber, plastics and other manufactures	2.27	2.52	2.91	1.99	2.58
Construction and engineering	3.26	3.37	0.96	2.74	2.14
Recoveries and repairs	6.86	7.81	5.35	10.67	7.10
Retailing	1.97	2.10	4.00	-0.66	2.51
Hotels and restaurants	3.41	3.71	7.52	-2.45	4.37
Transport and communications	-0.16	-0.22	0.35	-0.63	-0.02
Banking and insurance	1.51	1.61	3.65	-1.21	2.07
Real estate	3.85	4.21	7.58	-0.84	4.89
Private education	1.62	1.79	3.74	-0.93	2.22
Private healthcare	1.93	2.10	4.57	-1.31	2.65
Other sales services	1.01	1.09	1.62	0.30	1.20
Domestic service	3.22	3.48	7.88	-2.41	4.50
Public education	0.09	0.10	0.22	-0.06	0.13
Public healthcare	0.14	0.15	0.33	-0.09	0.20
Public services	0.03	0.03	0.07	-0.02	0.04

Table A.6: Changes in exports (thousand of euros) without improvement in productivity of Irrigated land.

Sectors	Scenario 1	%	Scenario 2	%	Scenario 3	%	Scenario 4	%	Scenario 5	%
Irrigated land	-42281	-36.80	-48320	-42.06	-50717	-44.15	-17885	-15.57	-43785	-38.11
Unirrigated land	-9158	-12.23	-10954	-14.63	-14735	-19.68	-6143	-8.20	-11842	-15.82
Livestock	-44064	-18.69	-50316	-21.35	-64321	-27.29	-20206	-8.57	-51633	-21.91
Energy products	-2905	-7.39	2036	5.18	-774	-1.97	2229	5.67	780	1.98
Water	-18	-11.37	-19	-12.28	-18	-11.89	-11	-7.10	-17	-11.13
Minerals and metals	245	5.86	291	6.95	169	4.04	309	7.37	236	5.64
Minerals and non-metal products	2728	4.76	3157	5.51	1670	2.91	3182	5.55	2458	4.29
Chemicals	-10031	-4.22	-8703	-3.66	-8371	-3.52	1565	0.66	-6693	-2.82
Metal products and machinery	45961	9.18	51435	10.28	39862	7.96	66646	13.32	48088	9.61
Transport material	13720	26.23	15537	29.71	13266	25.36	17272	33.02	14531	27.78
Food, beverages and tobacco	-114976	-18.88	-133753	-21.97	-148638	-24.41	-95448	-15.68	-132764	-21.81
Textiles, leather and footwear	1819	4.37	1944	4.67	3094	7.44	-279	-0.67	2072	4.98
Paper, stationery and printing	5299	7.11	6190	8.31	3628	4.87	9867	13.24	5626	7.55
Wood, cork and wooden furniture	-945	-3.46	-1147	-4.20	-2156	-7.90	2208	8.09	-1018	-3.73
Rubber, plastics and other manufactures	2653	2.89	3352	3.66	3111	3.39	3897	4.25	3300	3.60
Construction and engineering	33	4.38	35	4.57	14	1.85	32	4.25	25	3.24
Recoveries and repairs	102	13.83	117	15.89	88	12.02	159	21.66	110	14.92
Retailing	8146	5.44	8835	5.90	10836	7.24	4412	2.95	8960	5.98
Hotels and restaurants	304	3.72	314	3.85	475	5.81	-376	-4.61	260	3.19
Transport and communications	517	1.87	590	2.13	647	2.34	497	1.80	598	2.16
Banking and insurance	32	1.16	31	1.13	89	3.26	-37	-1.37	46	1.69
Real estate	1184	7.54	1278	8.14	1729	11.01	434	2.76	1336	8.51
Private education	12	1.59	13	1.64	27	3.51	-7	-0.97	16	2.04
Private healthcare	41	3.15	44	3.40	71	5.53	-2	-0.19	48	3.74
Other sales services	938	2.45	999	2.61	1115	2.91	770	2.01	1007	2.63
Domestic service	13	2.14	12	2.06	40	6.81	-18	-3.12	20	3.37
Public education	0	-0.29	-1	-0.47	0	-0.22	0	-0.15	0	-0.30
Public healthcare	-1	-0.23	-1	-0.32	-1	-0.17	0	-0.07	-1	-0.21
Public services	0	-0.08	0	-0.20	0	-0.25	0	0.31	0	-0.14

Table A.7: Changes in imports (thousand of euros) without improvement in productivity of Irrigated land.

Sectors	Scenario 1	%	Scenario 2	%	Scenario 3	%	Scenario 4	%	Scenario 5	%
Irrigated land	-5617	-5.90	-6467	-6.80	-11994	-12.60	-9410	-9.89	-9686	-10.18
Unirrigated land	-11023	-11.74	-12846	-13.68	-13427	-14.30	-9512	-10.13	-12433	-13.24
Livestock	-14088	-13.48	-16480	-15.77	-16729	-16.01	-13373	-12.80	-15908	-15.22
Energy products	7689	10.41	6505	8.81	179	0.24	5850	7.92	3434	4.65
Water	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Minerals and metals	201	3.17	223	3.51	75	1.18	213	3.36	152	2.39
Minerals and non-metal products	2194	2.60	2179	2.58	370	0.44	1662	1.97	1250	1.48
Chemicals	-17991	-3.11	-19894	-3.44	-21441	-3.71	-5805	-1.00	-18082	-3.13
Metal products and machinery	17913	4.18	20007	4.67	14233	3.32	24885	5.81	17943	4.19
Transport material	878	5.53	988	6.23	1234	7.78	567	3.58	1019	6.42
Food, beverages and tobacco	-18666	-4.30	-21919	-5.05	-15955	-3.67	-23169	-5.34	-19295	-4.44
Textiles, leather and footwear	2088	3.53	2320	3.92	4323	7.31	-646	-1.09	2727	4.61
Paper, stationery and printing	207	0.49	220	0.52	470	1.11	-20	-0.05	300	0.71
Wood, cork and wooden furniture	326	1.85	349	1.98	65	0.37	543	3.08	247	1.40
Rubber, plastics and other manufactures	1357	2.15	1447	2.29	1708	2.71	970	1.54	1470	2.33
Construction and engineering	11	2.71	11	2.77	2	0.40	8	2.00	6	1.54
Recoveries and repairs	61	6.43	70	7.32	47	4.94	96	10.01	63	6.63
Retailing	439	0.57	446	0.58	2023	2.64	-1610	-2.10	831	1.08
Hotels and restaurants	395	3.26	442	3.64	912	7.53	-167	-1.38	555	4.58
Transport and communications	-554	-0.94	-659	-1.12	-286	-0.49	-913	-1.55	-520	-0.88
Banking and insurance	64	1.68	70	1.85	143	3.77	-43	-1.14	84	2.22
Real estate	172	2.12	193	2.38	480	5.93	-204	-2.52	257	3.18
Private education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Private healthcare	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Other sales services	558	0.49	624	0.55	1255	1.11	-348	-0.31	752	0.66
Domestic service	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Public education	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Public healthcare	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Public services	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00

Table A.8: Changes in domestic water uses (Dm³) without improvement in productivity of Irrigated land.

	Households					Exporters				
Sectors	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Irrigated land	7.044	9.437	17.064	-397	11.014	-130.100	-145.447	-152.382	-59.705	-130.751
Unirrigated land	218	280	338	-45	245	-739	-802	-1.505	-837	-1.137
Livestock	150	190	248	21	184	-9.138	-9.554	-14.768	-4.416	-11.067
Energy products	-995	-1.158	2.656	-2.795	247	-3.137	-582	-547	-371	-520
Water	73	85	111	19	84	-2	-2	-2	-1	-2
Minerals and metals	0	0	0	0	0	8	8	10	6	8
Minerals and non-metal products	1	1	7	-3	3	60	50	98	31	67
Chemicals	375	404	754	-133	467	-431	-294	-21	136	-91
Metal products and machinery	29	30	68	-11	39	1.022	1.094	1.169	1.181	1.124
Transport material	21	23	36	5	26	416	468	429	487	445
Food, beverages and tobacco	16.157	21.767	30.712	-7.102	20.335	-57.406	-61.752	-72.234	-69.005	-67.239
Textiles, leather and footwear	281	353	518	-66	346	202	249	328	-16	232
Paper, stationery and printing	198	248	326	35	242	1.365	1.717	1.475	1.405	1.534
Wood, cork and wooden furniture	25	32	44	3	32	346	506	283	806	457
Rubber, plastics and other manufactures	110	123	274	-97	153	236	296	337	217	296
Construction and engineering	154	186	317	-40	201	3	3	3	1	3
Recoveries and repairs	0	0	0	0	0	2	2	2	3	2
Retailing	330	315	962	-322	485	191	184	390	-10	238
Hotels and restaurants	14.192	18.501	25.586	-4.026	17.276	233	298	360	-103	246
Transport and communications	47	21	262	-149	98	-2	-13	39	-27	7
Banking and insurance	41	44	119	-44	61	1	1	5	-2	2
Real estate	312	372	618	-58	399	31	35	50	5	36
Private education	40	49	86	-20	53	2	2	3	-1	2
Private healthcare	169	200	348	-66	216	4	5	7	-1	5
Other sales services	111	120	272	-73	152	35	38	67	0	43
Domestic service	0	0	0	0	0	0	0	0	0	0
Public education	3	3	6	-2	4	0	0	0	0	0
Public healthcare	30	36	62	-12	39	1	1	1	0	1
Public services	19	24	38	-4	25	0	1	1	0	0
Total variation in water use (Dm3)	*39.134*	*51.686*	*81.832*	*-15.381*	*52.423*	*-196.796*	*-213.487*	*-236.398*	*-130.216*	*-206.058*
% of total water use	*2,41*	*3,19*	*5,05*	*-0,95*	*3,23*	*-12,14*	*-13,17*	*-14,59*	*-8,03*	*-12,71*

**Values per million euros*

Table A.9: Changes in total water uses (Dm³) without improvement in productivity of Irrigated land.

	Households					Exporters					Importers				
Sectors	Scena-rio 1	Scena-rio 2	Scena-rio 3	Scena-rio 4	Scena-rio 5	Scena-rio 1	Scena-rio 2	Scena-rio 3	Scena-rio 4	Scena-rio 5	Scena-rio 1	Scena-rio 2	Scena-rio 3	Scena-rio 4	Scena-rio 5
Irrigated land	8.366	10.979	19.422	254	12.759	-140.110	-157.179	-164.775	-61.747	-140.805	24.605	36.294	14.440	-27.433	12.958
Unirrigated land	2.100	2.511	3.418	817	2.598	-991	-1.247	-3.677	-247	-2.201	-830	-749	79	-1.867	-561
Livestock	255	314	412	69	312	-11.650	-12.381	-19.676	-3.944	-14.280	-1.924	-1.928	-1.433	-4.243	-2.105
Energy products	-1.221	-1.418	3.259	-3.424	305	-3.849	-712	-672	-450	-637	3.443	785	124	476	415
Water	74	85	114	18	85	-2	-2	-2	-2	-2	0	0	0	0	0
Minerals and metals	0	0	0	0	0	13	13	16	12	14	6	3	9	-2	5
Minerals and non-metal products	2	2	11	-5	4	99	91	145	71	110	40	-7	88	-68	23
Chemicals	593	641	1.160	-186	729	-597	-374	-15	279	-91	-459	-712	-204	-772	-501
Metal products and machinery	34	34	109	-54	53	1.696	1.832	1.848	2.062	1.850	571	584	749	470	626
Transport material	24	26	49	-5	31	670	752	677	798	712	48	52	72	24	55
Food, beverages and tobacco	25.991	33.236	45.857	-3.009	32.116	-71.194	-78.133	-92.202	-80.842	-84.219	14.810	22.294	30.205	-13.771	18.860
Textiles, leather and footwear	403	492	741	-63	499	301	358	457	22	336	375	461	641	6	454
Paper, stationery and printing	278	341	466	51	342	1.959	2.420	2.075	2.170	2.196	610	771	885	265	722
Wood, cork and wooden furniture	32	41	56	5	41	438	613	345	1.072	573	617	795	763	394	699
Rubber, plastics and other manufactures	160	178	388	-129	219	345	428	475	334	426	180	190	274	24	196
Construction and engineering	192	228	403	-53	253	4	4	4	2	4	2	2	2	0	2
Recoveries and repairs	0	0	0	0	0	4	4	4	5	4	2	2	2	2	2
Retailing	479	465	1.310	-378	687	276	269	529	21	337	19	5	152	-112	49
Hotels and restaurants	20.900	26.312	35.813	-1.546	25.159	342	425	508	-76	362	487	620	833	24	601
Transport and communications	76	46	357	-184	143	2	-12	52	-28	13	-67	-106	36	-143	-49
Banking and insurance	58	61	160	-51	84	2	2	6	-3	3	3	3	10	-3	5
Real estate	392	460	782	-70	503	39	45	64	8	46	11	13	24	-5	14
Private education	59	70	119	-16	76	2	3	4	0	3	0	0	0	0	0
Private healthcare	246	286	484	-59	310	6	7	10	0	7	0	0	0	0	0
Other sales services	169	182	393	-86	227	54	57	94	11	65	85	89	208	-54	114
Domestic service	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Public education	4	4	8	-2	5	0	0	0	0	0	0	0	0	0	0
Public healthcare	44	51	87	-12	56	1	1	1	0	1	0	0	0	0	0
Public services	24	30	46	-3	31	1	1	1	0	1	0	0	0	0	0
Total variation in water use (Dm3)	*59.735*	*75.659*	*115.426*	*-8.122*	*77.630*	*-222.140*	*-242.715*	*-273.703*	*-140.472*	*-235.171*	*42.631*	*59.461*	*47.957*	*-46.789*	*32.585*
% of total water use	*2,79*	*3,53*	*5,39*	*-0,38*	*3,63*	*-10,37*	*-11,34*	*-12,78*	*-6,56*	*-10,98*	*1,99*	*2,78*	*2,24*	*-2,19*	*1,52*

**Values per million euros*

.

Table A.10: Effects in prices in % after an increase in productivity of Irrigated land.

Productivity	**5%**					**10%**					**15%**				
Sectors	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Irrigated land	5.98	8.35	0.70	-3.70	2.21	0.89	3.29	-3.76	-9.11	-2.61	-4.11	-1.63	-8.10	-14.58	-7.33
Unirrigated land	-0.01	0.05	0.52	-0.28	0.21	-0.08	-0.02	0.47	-0.34	0.14	-0.16	-0.10	0.41	-0.41	0.08
Livestock	0.76	0.87	1.88	-1.16	0.96	0.43	0.55	1.61	-1.50	0.65	0.10	0.23	1.34	-1.84	0.35
Energy products	4.77	1.26	-0.11	1.01	0.56	5.22	1.69	0.25	1.52	0.98	5.68	2.13	0.61	2.08	1.39
Water	0.85	0.37	-0.57	0.30	-0.08	1.26	0.77	-0.23	0.74	0.30	1.68	1.17	0.12	1.20	0.69
Minerals and metals	-0.31	-0.49	-0.47	-0.60	-0.49	0.03	-0.15	-0.18	-0.23	-0.18	0.38	0.18	0.10	0.15	0.14
Minerals and non-metal products	-0.18	-0.34	-0.33	-0.47	-0.36	0.09	-0.08	-0.10	-0.19	-0.10	0.36	0.19	0.13	0.09	0.15
Chemicals	0.28	0.15	-0.01	-0.11	0.03	0.39	0.26	0.10	0.00	0.14	0.51	0.38	0.20	0.12	0.25
Metal products and machinery	-0.31	-0.39	-0.33	-0.62	-0.39	0.01	-0.07	-0.05	-0.30	-0.09	0.32	0.25	0.23	0.00	0.20
Transport material	-0.99	-1.21	-0.85	-1.72	-1.10	-0.02	-0.24	-0.02	-0.69	-0.19	0.87	0.66	0.75	0.25	0.65
Food, beverages and tobacco	1.84	2.50	2.77	0.70	2.25	0.37	1.08	1.57	-0.97	0.91	-1.14	-0.37	0.36	-2.77	-0.48
Textiles, leather and footwear	-0.06	-0.04	0.01	-0.01	-0.01	0.03	0.04	0.09	0.05	0.07	0.11	0.13	0.17	0.10	0.15
Paper, stationery and printing	-0.39	-0.52	-0.21	-1.05	-0.47	-0.02	-0.16	0.09	-0.62	-0.13	0.36	0.21	0.38	-0.17	0.21
Wood, cork and wooden furniture	0.52	0.66	0.83	-1.12	0.39	0.22	0.36	0.57	-1.50	0.10	-0.07	0.08	0.32	-1.89	-0.18
Rubber, plastics and other manufactures	0.11	-0.02	-0.02	-0.30	-0.07	0.37	0.24	0.21	-0.05	0.18	0.63	0.50	0.43	0.20	0.42
Construction and engineering	-0.38	-0.43	-0.44	-0.62	-0.47	-0.08	-0.14	-0.19	-0.32	-0.19	0.21	0.15	0.06	-0.02	0.08
Recoveries and repairs	-0.23	-0.30	-0.26	-0.47	-0.31	0.03	-0.05	-0.03	-0.21	-0.06	0.28	0.20	0.18	0.04	0.17
Retailing	-1.07	-1.24	-1.10	-1.11	-1.14	-0.43	-0.62	-0.57	-0.38	-0.55	0.22	0.01	-0.05	0.41	0.05
Hotels and restaurants	-0.20	-0.10	-0.01	1.35	0.23	-0.22	-0.12	-0.03	1.35	0.21	-0.24	-0.15	-0.05	1.35	0.19
Transport and communications	-0.56	-0.72	-0.69	-0.72	-0.70	-0.14	-0.31	-0.34	-0.26	-0.31	0.29	0.11	0.01	0.22	0.09
Banking and insurance	0.21	0.29	0.17	0.01	0.19	0.21	0.29	0.19	-0.10	0.19	0.20	0.30	0.22	-0.26	0.19
Real estate	-1.36	-1.50	-1.33	-1.31	-1.38	-0.65	-0.81	-0.74	-0.47	-0.72	0.10	-0.10	-0.16	0.46	-0.04
Private education	0.07	0.14	0.05	0.01	0.09	0.13	0.20	0.12	-0.03	0.14	0.17	0.25	0.18	-0.10	0.18
Private healthcare	-0.43	-0.48	-0.48	-0.39	-0.46	-0.12	-0.18	-0.22	-0.06	-0.16	0.20	0.14	0.05	0.27	0.13
Other sales services	-0.37	-0.41	-0.40	-0.49	-0.41	-0.10	-0.15	-0.17	-0.23	-0.16	0.17	0.12	0.06	0.04	0.08
Domestic service	0.48	0.70	0.51	0.15	0.52	0.31	0.54	0.41	-0.21	0.36	0.12	0.38	0.30	-0.64	0.20
Public education	0.21	0.33	0.21	-0.07	0.21	0.19	0.32	0.21	-0.21	0.19	0.15	0.30	0.22	-0.41	0.16
Public healthcare	0.23	0.30	0.17	-0.09	0.17	0.23	0.30	0.19	-0.18	0.17	0.22	0.30	0.21	-0.32	0.17
Public services	0.10	*0.18*	0.03	-0.23	0.04	0.14	0.23	0.09	-0.28	0.08	0.18	0.27	0.14	-0.37	0.11

Table A.11: Effects in production in % after an increase in productivity of Irrigated land.

Productivity	**5%**					**10%**					**15%**				
Sectors	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Irrigated land	-8.46	-11.01	-12.19	-5.02	-10.42	-2.80	-5.75	-7.95	2.03	-5.40	3.59	0.10	-3.37	10.53	0.17
Unirrigated land	-7.15	-9.39	-11.13	-4.59	-9.29	-2.10	-4.67	-7.38	1.53	-4.85	3.55	0.54	-3.37	8.77	0.04
Livestock	-8.73	-11.41	-13.21	-5.76	-11.16	-2.66	-5.77	-8.71	1.73	-5.82	4.23	0.53	-3.85	10.75	0.13
Energy products	6.71	8.09	0.64	7.33	4.50	6.58	7.98	0.58	7.02	4.38	6.35	7.76	0.44	6.48	4.17
Water	-8.25	-10.08	-9.03	-3.39	-8.41	-5.31	-7.49	-6.97	1.62	-5.74	-1.68	-4.38	-4.54	8.46	-2.50
Minerals and metals	2.98	3.48	1.19	3.33	2.38	2.24	2.76	0.60	2.46	1.70	1.47	2.02	0.00	1.51	1.00
Minerals and non-metal products	2.81	2.95	0.79	2.35	1.84	2.61	2.77	0.66	2.03	1.67	2.35	2.55	0.50	1.58	1.45
Chemicals	-2.75	-3.07	-3.34	-0.01	-2.66	-2.08	-2.51	-2.94	1.16	-2.10	-1.18	-1.75	-2.42	2.85	-1.34
Metal products and machinery	2.55	3.08	1.97	4.27	2.72	0.61	1.12	0.30	2.19	0.88	-1.15	-0.66	-1.22	0.32	-0.79
Transport material	3.94	4.90	6.68	1.78	5.14	0.79	1.86	4.25	-2.35	2.26	-2.36	-1.11	1.91	-6.81	-0.59
Food, beverages and tobacco	-4.24	-5.49	-4.59	-4.15	-4.80	-1.69	-3.04	-2.57	-1.11	-2.47	0.97	-0.51	-0.51	2.22	-0.06
Textiles, leather and footwear	2.54	3.14	6.73	-2.80	3.79	0.94	1.82	5.80	-5.41	2.48	-1.26	-0.01	4.53	-9.23	0.69
Paper, stationery and printing	0.68	0.87	1.28	0.40	1.01	0.17	0.41	0.97	-0.55	0.56	-0.47	-0.14	0.60	-1.79	0.01
Wood, cork and wooden furniture	1.01	1.04	-0.63	3.58	0.71	0.85	0.89	-0.75	3.46	0.57	0.66	0.72	-0.88	3.32	0.42
Rubber, plastics and other manufactures	1.18	1.44	2.04	0.62	1.57	0.15	0.45	1.24	-0.73	0.62	-0.89	-0.53	0.46	-2.19	-0.32
Construction and engineering	3.14	3.27	0.89	2.53	2.04	2.94	3.11	0.78	2.21	1.88	2.66	2.88	0.62	1.73	1.66
Recoveries and repairs	3.69	4.65	2.74	7.02	4.14	0.70	1.67	0.28	3.51	1.34	-2.16	-1.16	-2.05	0.09	-1.34
Retailing	1.48	1.74	3.76	-1.48	2.13	0.72	1.13	3.34	-2.78	1.53	-0.36	0.24	2.74	-4.71	0.65
Hotels and restaurants	2.62	3.17	7.20	-3.93	3.80	1.27	2.12	6.53	-6.37	2.74	-0.79	0.48	5.46	-10.17	1.12
Transport and communications	-0.10	-0.14	0.43	-0.62	0.05	-0.06	-0.09	0.48	-0.70	0.09	-0.07	-0.07	0.51	-0.86	0.09
Banking and insurance	1.19	1.42	3.55	-1.86	1.85	0.59	0.96	3.26	-3.00	1.39	-0.37	0.21	2.78	-4.83	0.64
Real estate	2.81	3.39	6.99	-2.52	4.05	1.27	2.13	6.10	-5.05	2.80	-0.86	0.36	4.87	-8.78	1.06
Private education	1.21	1.49	3.55	-1.69	1.91	0.51	0.94	3.19	-2.92	1.36	-0.53	0.11	2.64	-4.83	0.53
Private healthcare	1.46	1.77	4.37	-2.19	2.30	0.64	1.14	3.95	-3.65	1.67	-0.59	0.15	3.30	-5.93	0.68
Other sales services	0.67	0.78	1.38	-0.21	0.90	0.28	0.44	1.13	-0.84	0.56	-0.18	0.04	0.83	-1.65	0.16
Domestic service	2.47	2.99	7.61	-3.88	3.97	1.08	1.94	6.94	-6.43	2.91	-1.06	0.23	5.84	-10.49	1.23
Public education	0.07	0.09	0.21	-0.10	0.11	0.03	0.06	0.19	-0.18	0.08	-0.03	0.01	0.16	-0.29	0.03
Public healthcare	0.11	0.13	0.32	-0.15	0.17	0.05	0.08	0.29	-0.26	0.12	-0.05	0.01	0.24	-0.43	0.05
Public services	0.02	*0.03*	0.06	-0.03	0.03	0.01	0.02	0.06	-0.05	0.03	-0.01	0.00	0.05	-0.09	0.01

Table A.12: Effects in exports in % after an increase in productivity of Irrigated land.

Productivity	**5%**					**10%**					**15%**				
Cuentas	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Irrigated land	-22.87	-29.71	-33.16	6.21	-24.95	-5.32	-14.36	-19.83	35.62	-8.56	17.33	5.11	-3.43	77.19	12.29
Unirrigated land	-7.06	-9.77	-15.91	-2.16	-11.32	-1.37	-4.48	-11.91	4.73	-6.43	5.03	1.41	-7.61	12.84	-1.05
Livestock	-12.08	-15.15	-22.55	-0.13	-16.10	-4.71	-8.30	-17.46	9.67	-9.73	3.69	-0.60	-11.93	21.45	-2.60
Energy products	-8.71	3.65	-3.17	3.79	0.56	-10.09	2.06	-4.40	1.73	-0.92	-11.57	0.39	-5.67	-0.62	-2.48
Water	-9.49	-10.61	-10.60	-3.85	-9.42	-7.19	-8.62	-9.07	0.43	-7.34	-4.26	-6.15	-7.20	6.41	-4.73
Minerals and metals	3.99	5.09	2.48	5.32	3.89	2.13	3.26	0.95	3.22	2.17	0.27	1.44	-0.56	1.03	0.44
Minerals and non-metal products	3.53	4.30	1.89	4.21	3.15	2.26	3.07	0.86	2.79	1.98	0.95	1.80	-0.18	1.24	0.79
Chemicals	-4.46	-3.98	-3.87	0.73	-3.10	-4.52	-4.14	-4.11	1.13	-3.22	-4.36	-4.11	-4.21	2.04	-3.16
Metal products and machinery	4.67	5.72	4.05	8.54	5.33	0.56	1.57	0.49	4.20	1.43	-3.20	-2.22	-2.76	0.30	-2.14
Transport material	12.34	15.41	13.81	16.59	14.58	0.97	3.79	4.22	3.09	3.72	-8.72	-6.01	-3.97	-8.57	-5.54
Food, beverages and tobacco	-11.51	-15.08	-18.80	-6.99	-15.26	-3.27	-7.47	-12.76	3.18	-8.05	6.16	1.13	-6.17	15.57	0.06
Textiles, leather and footwear	2.83	3.35	6.39	-2.74	3.68	0.81	1.60	5.05	-5.63	1.98	-1.80	-0.65	3.40	-9.66	-0.19
Paper, stationery and printing	3.70	4.96	2.26	8.80	4.41	0.30	1.64	-0.32	4.25	1.28	-3.14	-1.69	-2.89	-0.52	-1.87
Wood, cork and wooden furniture	-1.88	-2.63	-6.58	10.37	-2.19	-0.38	-1.14	-5.34	12.68	-0.72	1.06	0.28	-4.14	15.13	0.71
Rubber, plastics and other manufactures	0.75	1.52	1.59	1.83	1.59	-1.30	-0.50	-0.11	-0.55	-0.33	-3.33	-2.47	-1.75	-2.98	-2.20
Construction and engineering	3.77	3.99	1.36	3.56	2.69	3.08	3.35	0.84	2.74	2.08	2.31	2.64	0.28	1.77	1.40
Recoveries and repairs	6.77	8.74	6.02	13.66	8.20	0.34	2.26	0.58	6.33	2.09	-5.55	-3.68	-4.41	-0.42	-3.51
Retailing	3.63	4.24	5.87	0.69	4.37	1.58	2.36	4.36	-2.05	2.56	-0.80	0.21	2.68	-5.46	0.48
Hotels and restaurants	2.96	3.34	5.54	-6.04	2.65	1.64	2.33	4.91	-8.42	1.64	-0.39	0.72	3.90	-12.14	0.07
Transport and communications	1.06	1.35	1.67	0.87	1.41	0.22	0.55	0.99	-0.16	0.64	-0.66	-0.29	0.29	-1.32	-0.17
Banking and insurance	0.85	0.95	3.13	-1.87	1.48	0.24	0.48	2.80	-2.84	1.01	-0.70	-0.28	2.28	-4.42	0.27
Real estate	5.19	6.04	9.30	-0.34	6.45	2.37	3.53	7.33	-4.31	4.00	-1.02	0.53	5.04	-9.47	1.08
Private education	1.09	1.26	3.22	-1.69	1.66	0.31	0.62	2.75	-2.88	1.03	-0.80	-0.30	2.10	-4.68	0.13
Private healthcare	2.16	2.56	4.87	-1.58	2.91	0.83	1.42	4.01	-3.55	1.79	-0.91	-0.07	2.91	-6.34	0.34
Other sales services	1.51	1.71	2.15	0.90	1.77	0.52	0.77	1.37	-0.33	0.87	-0.55	-0.23	0.56	-1.75	-0.09
Domestic service	1.69	1.85	6.73	-4.10	3.11	0.59	1.06	6.25	-6.12	2.31	-1.25	-0.37	5.33	-9.56	0.91
Public education	-0.27	-0.44	-0.23	0.01	-0.27	-0.27	-0.45	-0.26	0.16	-0.27	-0.27	-0.47	-0.30	0.37	-0.27
Public healthcare	-0.26	-0.34	-0.22	-0.01	-0.23	-0.32	-0.40	-0.28	0.03	-0.28	-0.39	-0.47	-0.36	0.08	-0.34
Public services	-0.15	*-0.27*	-0.33	0.35	-0.19	-0.22	-0.35	-0.42	0.40	-0.26	-0.29	-0.43	-0.52	0.51	-0.33

Table A.13: Effects in imports in % after an increase in productivity of Irrigated land.

Productivity	**5%**					**10%**					**15%**				
Sectors	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Irrigated land	-4.10	-5.11	-11.70	-7.84	-8.84	-2.11	-3.28	-10.74	-5.47	-7.39	0.17	-1.21	-9.69	-2.57	-5.75
Unirrigated land	-7.16	-9.35	-10.76	-4.81	-9.14	-2.17	-4.69	-7.04	1.25	-4.74	3.42	0.46	-3.06	8.42	0.10
Livestock	-8.18	-10.79	-11.90	-6.63	-10.48	-2.32	-5.36	-7.54	0.51	-5.33	4.31	0.71	-2.82	9.12	0.42
Energy products	10.76	9.17	0.55	8.20	4.97	11.01	9.44	0.78	8.32	5.20	11.15	9.60	0.93	8.24	5.33
Water	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Minerals and metals	2.73	3.07	0.81	2.84	1.98	2.26	2.63	0.45	2.27	1.55	1.78	2.17	0.08	1.63	1.11
Minerals and non-metal products	2.67	2.67	0.52	1.96	1.55	2.68	2.71	0.58	1.87	1.58	2.65	2.70	0.60	1.66	1.57
Chemicals	-2.54	-2.95	-3.34	-0.10	-2.64	-1.77	-2.30	-2.87	1.16	-1.99	-0.77	-1.45	-2.26	2.95	-1.15
Metal products and machinery	2.30	2.76	1.71	3.76	2.40	0.62	1.06	0.26	1.94	0.81	-0.90	-0.46	-1.04	0.32	-0.63
Transport material	3.12	3.88	5.95	0.38	4.21	0.78	1.67	4.24	-2.89	2.10	-1.68	-0.59	2.52	-6.62	-0.07
Food, beverages and tobacco	-2.83	-3.60	-2.49	-3.62	-3.08	-1.40	-2.20	-1.35	-1.88	-1.76	0.04	-0.81	-0.23	-0.05	-0.44
Textiles, leather and footwear	2.49	3.10	6.74	-2.81	3.78	0.96	1.85	5.88	-5.37	2.55	-1.17	0.09	4.68	-9.16	0.81
Paper, stationery and printing	0.37	0.45	1.11	-0.45	0.63	0.16	0.28	1.04	-1.05	0.45	-0.18	0.02	0.90	-1.92	0.18
Wood, cork and wooden furniture	1.43	1.57	0.03	2.65	1.02	1.03	1.18	-0.30	2.22	0.65	0.61	0.78	-0.63	1.75	0.28
Rubber, plastics and other manufactures	1.27	1.43	2.03	0.38	1.52	0.44	0.64	1.40	-0.76	0.76	-0.39	-0.14	0.80	-2.03	0.01
Construction and engineering	2.82	2.91	0.54	2.03	1.66	2.87	2.99	0.63	1.95	1.73	2.84	3.01	0.67	1.71	1.72
Recoveries and repairs	3.50	4.40	2.52	6.61	3.88	0.73	1.64	0.25	3.34	1.29	-1.94	-1.00	-1.91	0.12	-1.20
Retailing	0.61	0.73	2.84	-2.36	1.20	0.38	0.63	2.87	-3.07	1.08	-0.18	0.25	2.70	-4.40	0.69
Hotels and restaurants	2.46	3.08	7.19	-2.89	3.99	1.09	2.01	6.50	-5.37	2.91	-0.98	0.36	5.42	-9.21	1.28
Transport and communications	-0.54	-0.71	-0.12	-1.20	-0.50	-0.17	-0.34	0.21	-0.90	-0.16	0.16	0.01	0.52	-0.68	0.16
Banking and insurance	1.36	1.65	3.69	-1.85	2.01	0.75	1.20	3.42	-3.08	1.54	-0.22	0.44	2.95	-5.03	0.79
Real estate	1.68	2.14	5.85	-3.54	2.90	0.75	1.47	5.47	-5.41	2.21	-0.78	0.28	4.74	-8.44	1.03
Private education	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Private healthcare	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other sales services	0.37	0.45	1.06	-0.61	0.56	0.20	0.32	0.99	-1.02	0.42	-0.05	0.13	0.88	-1.62	0.23
Domestic service	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Public education	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Public healthcare	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Public services	0.00	*0.00*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table A.14: Changes in domestic water uses (Dm³) with an increase in productivity by 10%.

	Households					Exporters				
Sectors	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Irrigated land	-4,736	-1,562	7,319	-15,727	-200	-54,581	-74,171	-85,465	36,082	-56,746
Unirrigated land	-121	-35	64	-481	-72	-804	-825	-1,581	-1,212	-1,246
Livestock	-44	7	86	-219	1	-7,865	-8,047	-13,972	-4,816	-10,223
Energy products	-1,693	-1,676	2,283	-3,982	-298	-3,765	-1,275	-1,135	-1,183	-1,181
Water	26	43	77	-50	42	-2	-2	-2	-1	-2
Minerals and metals	0	0	0	0	0	-1	-1	3	-4	0
Minerals and non-metal products	-1	-1	5	-7	0	-21	-29	30	-58	-9
Chemicals	128	207	612	-534	266	-829	-693	-385	-265	-476
Metal products and machinery	-5	0	42	-55	9	-148	-69	144	-83	10
Transport material	-1	3	19	-22	6	-7	34	67	-5	39
Food, beverages and tobacco	-12,197	-4,538	7,230	-43,546	-6,503	-45,022	-47,770	-62,859	-67,662	-57,748
Textiles, leather and footwear	-123	-26	180	-562	-35	-90	-28	81	-360	-43
Paper, stationery and printing	-61	0	105	-274	-5	-409	-53	-8	-801	-170
Wood, cork and wooden furniture	-13	-3	12	-43	-4	-524	-316	-419	-396	-372
Rubber, plastics and other manufactures	12	44	213	-256	71	-153	-84	8	-231	-71
Construction and engineering	-63	-18	135	-305	-3	-1	0	0	-3	0
Recoveries and repairs	0	0	0	0	0	0	0	0	0	0
Retailing	-173	-134	578	-981	34	-79	-70	167	-331	-13
Hotels and restaurants	-7,762	-2,145	7,033	-30,807	-3,537	-121	-34	67	-525	-85
Transport and communications	-65	-74	183	-305	0	-33	-43	12	-62	-22
Banking and insurance	-32	-22	62	-138	-6	-3	-2	2	-7	-1
Real estate	-111	-25	264	-571	1	-6	0	19	-38	1
Private education	-23	-9	35	-99	-6	-1	-1	1	-4	-1
Private healthcare	-54	-4	170	-353	10	-2	-1	3	-8	-1
Other sales services	-46	-21	150	-277	9	-26	-22	15	-73	-15
Domestic service	0	0	0	0	0	0	0	0	0	0
Public education	-2	-1	3	-7	0	0	0	0	0	0
Public healthcare	-6	3	34	-60	5	0	0	0	-1	0
Public services	202	209	225	173	209	7	7	7	6	7
Total variation in water use (Dm3)	*-26,964*	*-9,780*	*27,119*	*-99,489*	*-10,003*	*-114,488*	*-133,495*	*-165,203*	*-42,043*	*-128,367*
% of total water use	*-1.66*	*-0.60*	*1.67*	*-6.14*	*-0.62*	*-7.06*	*-8.24*	*-10.19*	*-2.59*	*-7.92*

**Values per million euros*

Table A.15: Changes in domestic water uses (Dm³) with an increase in productivity by 15%.

	Households					Exporters				
Sectors	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Irrigated land	-9,718	-7,934	1,692	-24,863	-6,720	1,259	-34,309	-48,450	90,780	-15,422
Unirrigated land	-261	-219	-93	-742	-257	-632	-905	-1,678	-1,536	-1,374
Livestock	-132	-96	-2	-358	-101	-6,102	-7,735	-13,959	-5,941	-10,282
Energy products	-3,772	-2,163	1,933	-5,099	-796	-5,250	-1,619	-1,424	-1,617	-1,511
Water	-18	15	56	-99	14	-4	-2	-2	-1	-2
Minerals and metals	0	0	0	0	0	-11	-6	-1	-9	-4
Minerals and non-metal products	-5	-3	3	-10	-1	-131	-69	-5	-104	-47
Chemicals	-142	36	491	-882	97	-1,255	-885	-559	-442	-660
Metal products and machinery	-38	-21	26	-88	-11	-860	-592	-319	-650	-493
Transport material	-17	-9	9	-39	-6	-187	-128	-73	-192	-116
Food, beverages and tobacco	-23,134	-20,057	-6,345	-65,405	-22,223	-28,324	-44,082	-61,200	-72,985	-56,600
Textiles, leather and footwear	-319	-243	-10	-856	-252	-225	-179	-51	-554	-192
Paper, stationery and printing	-185	-132	-11	-443	-135	-1,160	-874	-703	-1,833	-966
Wood, cork and wooden furniture	-29	-23	-5	-70	-23	-867	-776	-808	-1,081	-835
Rubber, plastics and other manufactures	-95	-25	162	-396	1	-409	-273	-155	-463	-254
Construction and engineering	-197	-134	34	-464	-119	-3	-2	-1	-5	-2
Recoveries and repairs	0	0	0	0	0	-2	-1	-1	-1	-1
Retailing	-686	-421	338	-1,436	-255	-319	-209	47	-517	-149
Hotels and restaurants	-16,483	-13,811	-3,277	-46,234	-15,246	-259	-221	-95	-767	-270
Transport and communications	-234	-142	129	-424	-67	-83	-58	-2	-80	-37
Banking and insurance	-95	-63	27	-199	-46	-6	-4	0	-10	-4
Real estate	-370	-249	68	-873	-221	-28	-18	3	-62	-17
Private education	-59	-44	4	-148	-41	-3	-3	-1	-7	-3
Private healthcare	-195	-129	63	-538	-115	-5	-4	0	-12	-4
Other sales services	-174	-110	76	-414	-79	-71	-53	-12	-112	-46
Domestic service	0	0	0	0	0	0	0	0	0	0
Public education	-4	-3	1	-10	-3	0	0	0	0	0
Public healthcare	-31	-19	16	-94	-17	-1	-1	0	-2	-1
Public services	188	194	213	153	195	7	7	7	6	7
Total variation in water use (Dm3)	*-56,204*	*-45,803*	*-4,401*	*-150,030*	*-46,429*	*-44,930*	*-93,000*	*-129,445*	*1,802*	*-89,285*
% of total water use	*-3.47*	*-2.83*	*-0.27*	*-9.26*	*-2.86*	*-2.77*	*-5.74*	*-7.99*	*0.11*	*-5.51*

**Values per million euros*

Table A.16: Total variation in water use.

	Via households					Via exports					Via households + Via exports				
	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Productivity 0%	2,41	3,19	5,05	-0,95	3,23	-12,14	-13,17	-14,59	-8,03	-12,71	-9,73	-9,98	-9,54	-8,98	-9,48
Productivity 10%	-1.66	-0.60	1.67	-6.14	-0.62	-7.06	-8.24	-10.19	-2.59	-7.92	-8.73	-8.84	-8.52	-8.73	-8.54
Productivity 15%	-3.47	-2.83	-0.27	-9.26	-2.86	-2.77	-5.74	-7.99	0.11	-5.51	-6.24	-8.56	-8.26	-9.15	-8.37