

## ***Interactive comment on “Risk of water scarcity and water policy implications for crop production in the Ebro Basin in Spain” by S. Quiroga et al.***

### **Anonymous Referee #1**

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The paper is interesting and tackles a theme of scientific and policy relevance. However as it stands now and given some weaknesses in its development it could be suitable to publications only after major revisions. In what follows I suggest some general and specific comments that could help the re-drafting process.

#### General comment

- I found somewhat inconsistent the title of the paper and its more or less explicitly stated aims, with the content of the paper itself. Water policies are mentioned in the title; focus on the demand side is defined as very important in the introduction. Accordingly, the reader would then expect analyses/suggestions of optimal water management among different crops or of changes in crop mix to minimize losses in the

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presence of water scarcity, but both aspects are only marginally developed. What the paper does is in fact an (interesting) impact assessment exercise quantifying the implications on agricultural value added of water restrictions. I agree that this is the necessary first step to discuss then possible policies, but just the first step. I would suggest to state very clearly since the beginning the very goal of the work.

#### Specific comments

- line 19 page 5898. The term “social capital” to describe labour and technology in a production function is not the most appropriate. It recalls and may confuse with the jargon of the sustainable development literature referring to institutional capacity, social safety nets and mutual trust among people. Also the use of the term “technology” as other from labour is ambiguous and partly imprecise. In standard economics, “technology” refers to factors of production (capital, labour etc.) and to how they are combined to produce. Thus saying “labour and technology” is not appropriate as labour is already incorporated in the concept of technology. I would rather use the words economic component (labour and capital) as opposed to the natural component. But this is just a suggestion. What is important is to be clear in the definitions.

- Lines 11 - 28 page 5899 and lines 1 - 5 page 5900. The extended theoretical justification of the choice of the production function is not really necessary. I would simply say that the functional specification developed thereafter is based on a Cobb Douglas specification with estimated elasticity of substitutions and address the reader directly to the following section for the description of the estimation procedure. Nevertheless, if authors feel necessary to explain in detail they should be more rigorous. For instance why if  $K$  tends to infinite  $R$  should tend to zero? I know the theory behind this, but this is not at all clear from equation (2). Some additional motivations should be provided.

- Line 8 page 5901. I found quite surprising that in the specification of the production function both fertilizer use and technological progress are missing. They are both essential components explaining yield performances. The role of fertilizers is also de-

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scribed as an important add up in the conclusions. And, the inclusion of a time trend to capture technological improvements in the production processes turns out to be usually highly statistically significant in those kind of regression. Their exclusion should thus be motivated. Is it a problem of data availability? Does it depends on weak explanatory power? Etc.

- Lines 22 page 5902 to 2 page 5903. All rather messy. I would suggest to say simply that as usual the choice of the explanatory variables to include in the final specification follows a deductive approach based on the Akaike and Schwartz criteria. In that, please consider my comment above on fertilizers and technological progress.

- The role of the value added equation is not completely clear to me. If it is meant to be explanatory, its specification should be much richer including at least crop prices among the independent variables. If it is just a way to link value added and yields, thus it is manly a descriptive device, it could be acceptable. But this should be clearly stated. In addition, even under the descriptive view point the explanatory power is extremely weak. Justification should be provided both on the specification used and on its use within the study.

- Lines 14 to 16 page 5907 not needed. They are just a repetition of what already stated.

- Line 11 page 5910. Not clear that and why the loss is larger when irrigation is reduced the 10 20% than when it is reduced the 30%. In fact as far as yields are concerned (table 8) this is not the case. And because of the positive relationship between yields and value added this should be also true in monetary terms. Perhaps I'm missing some point, but further explanations could be useful.

- In table 5 apparently the use of machineries has a negative impact on alfalfa and wheat yield, whereas labour has a negative impact on maize and barley production. Am I wrong? If not this is quite surprising and important explanation for this should be provided.

Minor comments:

- I suggest to number all the equations in the text.
- There are some typos to correct. In general the paper would benefit from an English revision.

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