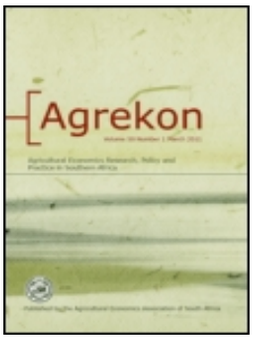

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INSTITUTIONS AND ECONOMIC RESEARCH: A CASE OF LOCATION EXTERNALITIES ON AGRICULTURAL RESOURCE ALLOCATION IN THE KAT RIVER BASIN, SOUTH AFRICA – A REJOINDER

CN Mbatha* and GG Antrobus**

ABSTRACT

In Mbatha and Antrobus (2008), an argument was put forward against an importation or adoption of universal models or general theorems to explain locally prevailing socio-economic conditions and predict outcomes in varied geographical contexts such as in the Kat River basin. In response to this argument a comment in this edition argues that our "results are caused by, metaphorically speaking, comparing apples and oranges. If, however, all of the relevant information is taken into account, a simple economic model may suffice to depict the situation within the KRV." Here we illustrate that the comment comes from a misreading of basic details in the original discussion and in its construction and presentation of an alternative model of the KRV conditions the comment reiterates our original argument that general models and theorems are likely to fail to explain local intricacies primarily because they are not founded on local historical institutions.

Keywords: economic models, institutions, Kat River Valley

JEL Classification: B25

1. INTRODUCTION

In the article titled "Institutions and economic research: a case of location externalities on agricultural resource allocation in the Kat River basin, South Africa", a warning was issued against *an importation or adoption* of general models or theorems to explain prevailing socio-economic conditions and predict outcomes in varied geographical contexts. We supported and illustrated our proposition by using the Physical Externality Model (PEM) (Bromley, 1982) and the Kat River basin as the case study area. We showed that the PEM, which

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was developed outside an understanding of historical institutions operating in the basin, did not explain the prevailing conditions in the valley. To use Coase's (1998) metaphor, we likened the model to a blood circulation without a body. A blood circulation is of course important and because of that we also concluded that "without a doubt the Physical Externality model is useful (but only) as an initial framework ..." Mbatha and Antrobus (2008:486).

The critical comment to our argument selects and uses as the base for the criticism the following quote from our argument:

A word of caution for economic research undertakings from this discussion would be, firstly, to discard any belief that economic models can provide enough or even suitable tools for explaining socioeconomic systems, secondly, to always factor and investigate the effects, at least, of the most dominant institutions in their practice on the ground.

The comment paper then responds, stating that our "results are caused by, metaphorically speaking, comparing apples and oranges. If, however, all of the relevant information is taken into account, a simple economic model may suffice to depict the situation within the KRV." While there is agreement that dominant institutions have to be investigated in context, our assertion that economic models such as the PEM, which is imported from other areas, will not provide enough or suitable tools for explaining socioeconomic systems. The comment paper then proceeds by developing an *alternative optimisation* model[1] using simple algebraic equations to illustrate how a formal model could be developed to explain the KRV *status quo*.

In reply, we observe the following:

(a) the critical comment comes from a misreading of information and misunderstanding of parts of our argument;
(b) many other incorrect assumptions are made in developing what is then presented as the *alternative optimisation* model in the comment paper;
(c) mainly because of the misreading of crucial information from our argument, the alternative optimisation model presented in the comment paper still misrepresents the KRV conditions, even though some of these conditions were explained in the text and depicted in maps and tables in Mbatha and Antrobus (2008);
(d) the use of numerous assumptions in developing general models such as the PEM, instead of factoring in information from prevailing conditions, is at the core of the inaccuracies of such models, including to some degree the *alternative optimisation model*, which is presented in the comment paper,

because it also relies on too many assumptions having misread the original presentation; and

(e) we also want to state that the general theorisation exercise that we criticised does not only relate to models presented in mathematical language, we include general theorems and models that are presented in plain language.

Therefore the reply to the critical comment is structured along these preceding observations. In Section two we explain what was misread and then misunderstood in the original text. Section three identifies and discusses the inaccurate assumptions that form the foundations of the alternative optimisation model and how the exercise is then not dissimilar to general theorisation processes, which often lead to inaccurate conclusions. A concluding discussion is provided in Section four.

2. MISUNDERSTANDING AND MISREADING OF INFORMATION AND PARTS OF THE ARGUMENT

It is a misunderstanding of our original argument that the KRV *status quo* or any other socio-geographical context could not be somewhat represented formally using mathematical tools. Of course mathematically or linguistically presented models or theorems are by definition abstractions of truth. While some would fare better than others, none would provide a perfect representation of reality. But that is besides our original point. The point made was that imported general models, developed outside relevant socio-geographical contexts, and then adopted as tools for analysis to explain the *status quo* in new contexts have serious limitations and high probabilities for misrepresenting the truth. In the case of the Physical Externality Model, which was developed outside the basin, the lesson was clear and also acknowledged by the comment as being true. While conventional models such as the PEM and those reviewed in Beard (2011) would predict that farmers located in the Upper KRV would be better off than those located at downstream positions, this was found to be untrue in the KRV. Nonetheless, we did not argue that once historical and institutional contexts are taken into account in the explanation of the *status quo* that the explanation cannot be then formalised or presented in mathematical language. This is the main misunderstanding presented in the comment paper.

There is also evidence that other basic information was misread from the original paper, which may have contributed to some of the misunderstanding of the original argument. *Firstly*, the comment paper erroneously states that the KRV dam is located in the Middle KRV[2], while it was *stated and illustrated* on Map 1[3]

and Appendix 1 in Mbatha and Antrobus (2008: 477; 491) that the Kat River dam was located in the Upper KRV.

Secondly, there is confusion made between *land availability versus land development*[4] in the comment paper. From this confusion the comment paper erroneously states as a condition for developing its alternative model that "land availability differs across river sections, being highest in the Lower Kat River region and extremely limited in the Upper Kat River region". This is incorrect. Land was highly available in the Upper KRV, even though it was underdeveloped due to socio-historical factors. In any case, Mbatha and Antrobus (2008:481) explained that "the formal *scheduling rules* provided farmers in the Middle Kat with water security and decision making powers around water allocation and management, but the same rules provided the Lower Kat farmers with *de facto* opportunities for unrestricted land development to produce citrus". To paraphrase, while scheduling rules limited the opportunities to develop land for citrus production in the Middle Kat, the same rules did not prevent the Lower KRV farmers from developing larger sections of their land for citrus production. This is what led to the "citrus cultivation without water scheduling rights" phenomenon (479). Hence, it appears that the lack of distinction made between land availability versus land development in the comment paper stems from the misunderstanding of scheduling rights. This misunderstanding is systematically transferred as a conditional error in the development of the alternative optimisation model.

Thirdly, the comment paper erroneously assumes that citrus production took place in equal proportions in all three sections of the KRV[5]. It states that "all farmers, Upper, Middle and Lower Kat farmers, produce citrus fruits ... ". This was not the case in the KRV during the research period and could not be used as a condition in a formal modelling exercise. In contrast, Mbatha and Antrobus (2008:479) stated that "during the field visits between 2004 and 2007, citrus cultivation had remained the biggest agricultural activity, especially in the Middle and Lower reaches .... In fact some of the citrus farms, which were previously cultivated by White farmers in the Upper KRV were no longer in operation."[6] The Upper KRV farmers were mostly involved with crop subsistence farming, and to some degree tobacco farming. This information is also depicted in Map 1 (Mbatha and Antrobus, 2008:477) where in bold blocks it is stated that subsistence farming was practised in the Upper KRV, while commercial citrus production took place in the Middle and Lower KRV sections. Again, in Table 4[7], Mbatha and Antrobus (2008:483) painted a clear picture of who owned what physical assets in the basin for bulk water abstraction, citrus cultivation, for example weirs, boreholes, reservoirs, etc. No mention of farmers from the Upper KRV is made in the table, because not one was involved in commercial citrus farming at the time. In sum, many key but false assertions were made in the comment paper stemming

from what could be characterised as a misreading of the original KRV *status quo* discussion. We argue that these types of misunderstandings and some that cannot be observed from the texts are likely to have contributed to the main disagreement. Nevertheless, the optimisation model presented as a better alternative for the KRV in the comment paper and the main points of criticism can hardly be accepted as valid given the number of errors of interpretation.

3. THE ALTERNATIVE MODEL IS NOT GENERAL BUT STILL NOT USEFUL

The comment proposes an alternative model to replace the PEM as a way of illustrating that socio-economic conditions in whichever geographical context could be formally represented. The assumptions, *albeit* often inaccurate, made in the comment paper led to conclusions including that land development restrictions resulted in a situation that could be presented in the following manner:

$$\underline{l}_3 > \underline{l}_2 > \underline{l}_1 \quad \text{.....(1)}$$

where land development opportunities were greatest in the Lower KRV (l_3) and lowest in the Upper KRV(l_1).

We have mentioned how this is not a true representation within the KRV scheduling rights framework. The opportunities to develop land in the Upper KRV were very high, even though they could not be taken advantage of because of historical factors. The only region facing high restrictions was the Middle KRV and that was because those farmers were historically the most risk averse with respect to water guarantees and hence we could not assign the same level of risk to all KRV farmers[8], which again is the case and an error in the development of the alternative model[9]. In any case, given the influence of scheduling rights and historical factors, it could be argued that the highest land development opportunities lay instead in the Upper KRV and least in the Middle KRV, and this implies the following ordering:

$$\underline{l}_1 > \underline{l}_3 > \underline{l}_2$$

But even this argument would depend on other fluid political and socio-economic circumstances that we still could not ascertain during the period of South Africa's political transition. Therefore, an ordinal attempt to depict the land resource allocation situation would be a wasteful exercise for the KRV basin, where legal and political institutions are still uncertain and are changing rapidly with new laws under implementation.

The comment paper further postulates that the prevailing water restrictions could be depicted as follows:

$$\underline{w}_3 < \underline{w}_2 < \underline{w}_1 \text{ .....(2)}$$

where water restrictions are highest in the Lower KRV and lowest in the Upper KRV.

It does not make sense why the assertion would be made when the initial assumption was that the KRV dam was located in the Middle KRV – not in the Upper KRV. In fact, a contradictory statement is made in the comment stating that water is "relatively unrestricted in the Upper Kat section, due to farmers' location advantage of being closest to the water source". The question is how the Upper KRV farmers could be closest to the dam that is located in the Middle KRV, as per earlier assumption?

Nevertheless, and as would be expected, the predictions stemming from this alternative model would also be incorrect and not useful. Basically all the inaccurate assumptions made are systematically compounded in the model. In sum, the ordinal internal and external relationships depicted in equations (1) and (2) are incorrect[10]. For example, the model concludes that while restrictions for land development in the Upper KRV were highest, water restrictions on the other hand were lowest in that section. As explained earlier that was not true in the KRV. It is also not surprising that the model would incorrectly predict that the Lower KRV farmers would be located on the PPF, compared say with the Middle KRV farmers as depicted in the following equation from the comment:

$$z_1^* (\underline{w}_1, l_1^m) < z_2^* (\underline{w}_2, l_2^m) < z_3^* (\underline{w}_3, l_3^m) \text{.....(3)}$$

Mbatha and Antrobus (2008:482) illustrated some of the powers of Middle KRV farmers over Lower KRV farmers when stating that "between 2002 and 2004 the dam's water levels were kept at close to full capacity and way above the minimum levels of 60% ..., which are specified in official rules. The observations reiterate the conclusion made about the extent of decision making powers that the Middle Kat farmers (who managed water releases) had over the Lower Kat farmers." Furthermore, in Table 4 (Mbatha and Antrobus, 2008:483) a mere comparative scroll down the assets for the two groups of farmers indicates that the Middle KRV farmers had acquired more physical resources including reservoirs, pumps and weirs, boreholes and in total had cultivated more land for citrus production than the lower KRV farmers[11]. The one area in which it could be argued that the Lower KRV farmers had an advantage was with regard to their historical freedom to develop land for citrus production, having not chosen to subscribe to scheduling

rules. But that freedom was also at a cost and was limited by water restrictions as determined by the Middle KRV farmers. In any case the prediction is wrong that the Lower KRV farmers would in absolute economic terms be better off than all other farmer groups in the basin as suggested by the alternative model.

4. CONCLUDING DISCUSSION

This reply further reiterates the argument that limited and incorrect information (institutional and otherwise) as well as inaccurate assumptions in modelling exercises would render any model (formal or informal) not very useful for real world explanations, let alone predictions. The warning against an uncritical *importation* and adaptation of general models such as the PEM to any social context, such as the KRV, remains valid. A related and direct criticism against building abstract formal models outside any (or with incorrect) empirical evidence and the use of non-validated assumptions in building such models, as practised often by *mathematical* economists, is presented by McCloskey (1990; 2012). She labels this abstract modelling or theorisation exercise as one of the *two vices of economics*. Once she stated that "we have gained a proof by repeated example that blackboard economics (and mathematics[12]) doesn't amount to anything scientifically, that you can't prove anything about the world on a blackboard unaided by magnitudes (evidence) .... Small changes in assumptions can make big differences in conclusions ..." (McCloskey, 2012:9–10). This message is similar to the one contained in this reply and in Mbatha and Antrobus (2008), that general mathematical and economic theorems or models that are not substantiated by institutional truths and data that are context accurate and models that rely on numerous assumptions[13] are often not the right models and are hardly useful.

Although well intentioned, the construction of the alternative model in the comment paper to Mbatha and Antrobus (2008) does also provide one additional proof[14] that McCloskey (1990) speaks of in the preceding paragraph. This is precisely because the alternative model is founded on a number of inaccurate and sometimes contradictory readings and too many assumptions about the institutional and physical make-up of the basin that it leads to wrong conclusions. Besides the construction of the alternative model that is not very useful, the core disagreement or criticism of the comment seemingly is based on the misunderstanding of parts of Mbatha and Antrobus's (2008) main argument. We did not argue that modelling as an exercise is not useful. But we argued that modelling without correct and context specific information is not only useless but also a dangerous and costly exercise. This means that universal models or general theorems that are imported[15] from the classroom or another remote geographical context do not provide much universal usefulness to varied degrees. To add, the usefulness of non-general models on the

other hand would also be locally bound and the models would need continuous revisions as local conditions and institutions evolve over time.

NOTES

1 This model is presented as being context specific and not universal like the PEM

2 "In the Middle Kat section there is a water dam, which is operated by Middle Kat farmers", a direct quote from the comment paper

3 See Appendix 1 of this reply

4 For many reasons land can be available without being developed. In the KRV this was mainly due to scheduling rules, which are discussed in Section 4.2 of Mbatha and Antrobus (2008). In short, the scheduling rights did not result in land development restrictions for the Upper Kat farmers. It was the historical politics of the homeland development system, instead, that resulted in the land being under developed in the Upper KRV in 2007. The same rules also resulted in land development restrictions in the Middle KRV, while the Lower KRV farmers were allowed to develop their land *albeit* with risks since they had no water guarantees.

5 "All farmers, Upper, Middle and Lower Kat farmers, produce citrus fruits..."

6 Due to historical homeland development factors

7 Appendix 2 in this reply

8 Based on historical choices.

9 The comment paper states that "all agents are supposed to be risk averse ", without validation.

10 And this means that the idea or assumption that water and land resources are substitute inputs in citrus production is not correct at least with respect to Upper KRV farmers.

11 Ten reservoirs (Middle KRV) versus 3 reservoirs (Lower KRV); 11 pumps and weirs (Middle KRV) versus 6 pumps and weirs (Lower KRV); 442 total hectares (Middle KRV) versus 276 total hectares (Lower KRV), etc.

12 In McCloskey (1990).

13 In developing the alternative model, more than eight cases of 'assumption making' could be counted in the space of only two pages of the comment paper.

14 Of course this was not the intention of the comment paper.

15 Not locally constructed.

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APPENDIX 1

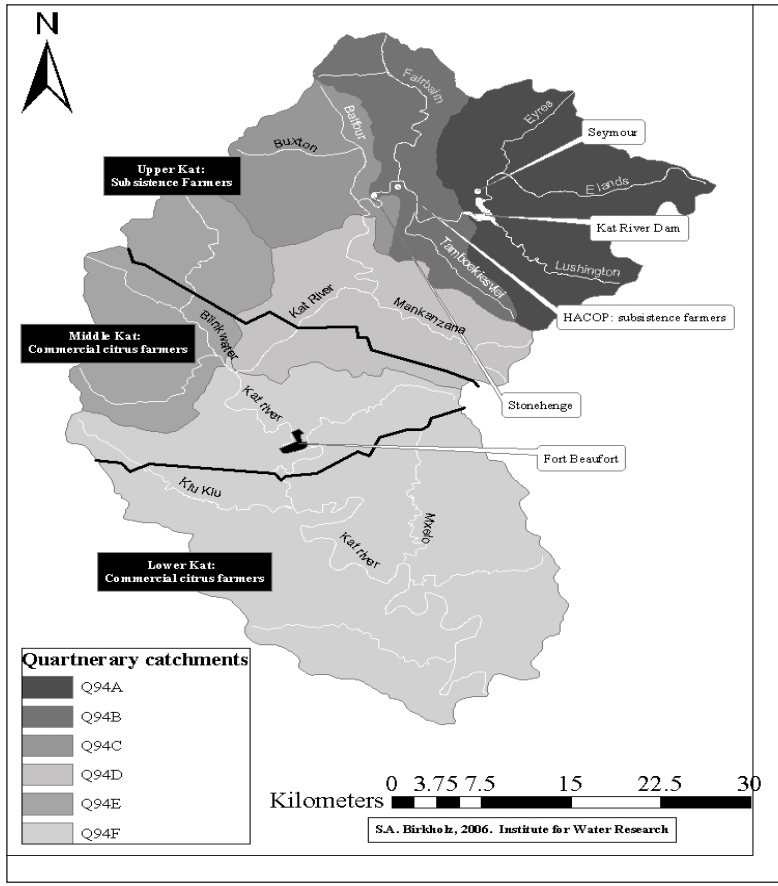

Figure 1: The map of Kat River and its tributaries (alternative sources of water)

Source Mbatha and Antrobu (2008)

APPENDIX 2

Table 1: The table on farm ownership and associated water scheduling

Enterprise	Reach	Number of on farm reservoirs	Scheduled hectares	Citrus cultivation	Weirs and pumps	Boreholes
A	Middle Kat	4	337	285.7	8	n/a
B	Middle Kat		61	50	1	n/a
C	Middle Kat	3	5	30	1	4
D	Middle Kat	N/a	24.5	21	n/a	n/a
E	Middle Kat	1	N/a	15 and 19	1	2
F	Middle Kat		11.5	20	0	n/a
G	Middle Kat	2	N/a	0	0	2
Total		10	439	442	11	8
H	Lower Kat	3	0	111	2	1
I	Lower Kat	N/a	0	0	n/a	n/a
J	Lower Kat	N/a	0	66	2	n/a
K	Lower Kat	N/a	0	63	n/a	n/a
L	Lower Kat	3	0	36	2	1 of 3 is used
Total		3	0	276	6	4

Source: Mbatha and Antrobus (2008)