Comment by Jan Oosterhaven on discussion paper 2012-59

From an academic point of view, this paper re-uses an outdated, already discarded methodology to measure the forward (downstream) linkages of the 20 industries in which it subdivides the Moroccan economy. Subsequently, the paper misinterprets the empirical forward linkages' outcomes. Further, in line with most of the literature in this field, this paper does not define key sectors by means of policy-relevant variables, such as employment or GDP, but by means of total industry output. Finally, just like all of the academic key sector literature, this paper only looks at the benefits of stimulating specific industries, while it does not address the question whether there are comparably large differences in costs or not. That is, the paper does not consider whether creating say 1000 extra jobs in agriculture requires the same amount of expenditures as creating 1000 extra jobs in manufacturing.

Section 2 of the paper contains a rather lengthy, entirely standard introduction to input-output analysis and the measurement of backward and forward linkages as done in the 1950s. The *total backward linkages* are still measured by taking the column sums of the Leontief-inverse, but forward linkages are no longer measured by taking its row sums, because these measure the backward linkages of an economically meaningless unit vector of final demand. The *total forward linkages* are nowadays measured by means of the row sums of the Ghosh-inverse, as only those sums give an indication to what extent the output of an industry is further processed and reprocessed before it ends up as final output.

The present text of this section, therefore, should be shortened considerably, while a summary of the recent literature should be added, including a substantiated choice between the total linkages defined above and alternative measures, such *net* backward and net forward *linkages*, and measures based on the *hypothetical extraction* of industries within the demand-driven Leontief model or the supply-driven Ghosh model. See Oosterhaven (1996) for a comparison of these two models, and see Temurshoev & Oosterhaven (2010) for an overview of the analytical relations between various linkage measures and an evaluation of their empirical (dis)similarities. An entirely rewritten version of the last paper is available upon request with the first author (utemurshoev@yahoo.com).

Some details: x_i just below Table 1 is unjustly defined as global supply (= sum of local production and imported production), whereas from (2) and (4) it follows that x_i equals local production. Also, it is better to define (1) as domestic *input* coefficients, as they equal the product of a real *technical* coefficient and a *trade* coefficient (i.e., the self-sufficiency ratio). Also, just below (4) it is unjustly stated that "This is especially true because ...". Also, note that in (8), nowadays, the far simpler Kronecker delta is used to indicate a 0-1 variable. Finally, as regards Section 2 and Table 5, note that it would be more natural to label category II as category I, III as II, and I as III.

Section 3, about the overall structure of the Moroccan economy, should warn the reader that the openness measure of (X+M)/GDP may easily reach values above 100%, as it compares gross values X+M with the net value of GDP. Also, note that the macro openness of 81% (reported on p. 9) seems at odd with the unclearly defined openness by industry, which varies between 12% and 110% (in Table 3). Finally, note that the paper unfortunately does not discuss the interesting outcomes of Table 3, nor the unnatural export rate of 121% for "industries" in 2007 in that table. Section 3 finishes with a discussion of the input coefficients, which is done in an illogical order on p.11. It would be better to first discuss the, to be added column totals of the appendix; then second, the,

also to be added weighted row totals of the Appendix; a d then third, the deviating cell values of the Appendix. In that case, Table 4, with the unjustly non-weighted row totals, simply becomes redundant.

Section 4 discusses the core result of the paper, the ordering of the industries in key sectors and non-key sectors. The wrong interpretation of the forward linkages shows up whenever the text speaks of industries as "providers of inputs", whereas a correct interpretation would have spoken about the "sensitivity of industries to a final demand change of an unit vector". Far and far better, of course, would be to redo the empirical analysis after a conscious choice is made between the different competing key sector indicators.

Section 5 concludes. I disagree with the conclusion that the Moroccan economy does "not reveal any structural change". I would consider the increasing openness of the Moroccan economy reported in the, non-discussed Table 4 as considerable, and probably also as structural. Not surprisingly, given the above comments, I disagree with the identification of the key sectors, and with the reported change therein between 1998 and 2007.

Finally, it should be noted that the conclusion that Morocco needs "not just a passive integration with other economies, but a strategic integration that is conductive to the development of a horizontal specialization (undefined in the paper)…" may be entirely right, but is not based on information given in the paper. To deliver a substantiated contribution to formulating an industry-specific development strategy for Morocco, it would be advisable and innovative to define key sectors as those sectors that have the best benefit/cost ratio of stimulating them with policy measures.

References

Oosterhaven, J. (1996) Leontief versus Ghoshian Price and Quantity Models. *Southern Economic Journal* 62/3: 750-9

Temurshoev, U & J. Oosterhaven (2010) On Input-Output Linkage Measures. Working Papers in IO Economics, WPIOX 10-002 (http://www.iioa.org/working%20papers/WPs/WPIOX10-002.pdf).