Title
The efficiency of South African wine grape producers

I want to submit an abstract for:
Conference Presentation

Corresponding Author
Nick Vink
E-Mail
nv@sun.ac.za
Affiliation
Stellenbosch University

Co-Author/s

<table>
<thead>
<tr>
<th>Name</th>
<th>E-Mail</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beatrice Conradie</td>
<td><a href="mailto:beatrice.conradie@uct.ac.za">beatrice.conradie@uct.ac.za</a></td>
<td>University of Cape Town</td>
</tr>
<tr>
<td>Jenifer Piesse</td>
<td><a href="mailto:jenifer.piesse@kcl.ac.uk">jenifer.piesse@kcl.ac.uk</a></td>
<td>Stellenbosch University</td>
</tr>
<tr>
<td>Colin Thirtle</td>
<td><a href="mailto:c.thirtle@imperial.ac.uk">c.thirtle@imperial.ac.uk</a></td>
<td>Stellenbosch University</td>
</tr>
</tbody>
</table>

Keywords
productivity; frontier production function; DEA; South Africa; wine producers

Research Question
What are the efficiency levels of South African wine grape producers and is there an inverse farm size-efficiency relationship?

Methods
The cost of production of 199 wine grape producers from across the production areas was analysed with an input oriented variable returns to scale data envelopment analysis.

Results
The mean efficiency was 0.416, i.e. the same output is possible with less than half the current inputs. A lack of scale efficiency was found as farms were too small.

Abstract
Sen (1962) observed an inverse relationship between farm size and output per hectare in India, and concluded that family farms used more inputs per hectare and produced a higher output per hectare than farms using hired labour because it made no sense to impute a wage to family members when there was no functioning labour market. However, when family labour was costed according to its opportunity cost then “much of Indian agriculture seems unremunerative” (Sen, 1982: 243)

This argument was followed by a substantial body of empirical support. Berry and Cline (1979) conducted an
extensive study on the existence of the relationship, testing the hypothesis for Brazil, Colombia, the Philippines, Pakistan and Malaysia. They concluded that (Berry and Cline 1979:4) “...the evidence presented ... points to systematically higher land productivity on small farms than on large ones, and to total factor productivities that are at least comparable...”

In the 2007/8 season 199 wine grape producers from all eight production regions across the wine producing areas of South Africa completed a cost of production survey, administered by VinPro, the wine producers’ industry association. The sample was stratified approximately evenly across the eight production regions (see Table). In 2008, the South African crush of 1.426 million tons was worth R3.313 billion. The industry was said to employ about 57,000 workers on 3,323 family farms and a total of over 250 000 when upstream and downstream linkages are also considered. Average yield in 2008 was 11.4 tons per hectare (14.9 t/ha in 2015) (see Table) and the average wine price was R2329 per ton.

An input oriented variable returns to scale data envelopment analysis (DEA) related grape revenue per hectare to the per-hectare wage bill, machinery cost, fertiliser, pesticide and herbicide cost and other cash expenses. The resulting mean efficiency was 0.416, which suggests that the same output is possible with less than half the current inputs. Only five farms (2.51%) were both scale and technically efficient, one each from Robertson and Olifants River and three from the Orange River area (all three areas with high yielding irrigated farming systems – see Table). A further nine farms had technical efficiency scores of 1.000, including five from the Orange River, three from Paarl and one from the Little Karoo. This means that they produced on the outer bound production function, but not efficiently.

With one Orange River exception, these additional nine farms were all too small. A lack of scale efficiency is a general problem as almost 90% of the farms were found to face increasing returns to scale, a result that contradicts the earlier study of Townsend et al. (1998), who found a weak inverse relationship between productivity and yield per hectare. A somewhat stronger inverse relationship was established between labour productivity and the number of permanent employees, reflecting the supervision costs on large farms. In some regions lower labour productivity translated into lower total factor productivity, but the relationship was weak, thus there was little evidence to support that land reform based on the inverse relationship.

In the current study, the mean level of technical inefficiency was slightly worse at 0.594 than the mean scale inefficiency at 0.668. Mean efficiencies differed in surprising ways across the regions. The Orange River and Olifants River were the most productive areas, with overall efficiency levels of 0.706 and 0.617 respectively. Breedekloof, Worcester, Robertson and Klein Karoo, which together account for almost 40% of total plantings, all recorded efficiencies of between 0.37 and 0.46. Paarl and Stellenbosch’s performance was the weakest with mean efficiencies of 0.281 and 0.128 respectively.

While everyone agrees that the industry is more robust “across the mountains” (i.e. Worcester, Breedekloof, Robertson) than in Paarl or Stellenbosch, the Orange and Olifants River regions’ good performance was not anticipated. Their good performance is probably due to a combination of lower wages (further from Cape Town) and expansion providing an opportunity to adopt the newest technology.

Efficiency by wine region in South Africa according to DEA (n=199)
Region % sample Yield TE SE Overall
Breedekloof 16 19.8 0.592 0.759 0.457
Klein Karoo 7 15.4 0.548 0.668 0.373
Olifants River 12 23.3 0.679 0.900 0.617
Orange River 13 27.8 0.783 0.893 0.706
Paarl 14 9.2 0.600 0.469 0.281
Robertson 14 16.1 0.602 0.669 0.397
Stellenbosch 14 7.9 0.419 0.308 0.128
Worcester 11 19.3 0.533 0.749 0.402
The main implication of these findings is that the envisaged land redistribution policies, e.g. the introduction of land ceilings, and redistributive policies in general, e.g. a further substantial increase in the minimum wage, could have adverse consequences. Further analyses will be addressed to these issues.

References