**Reviewer: 1**

**Comments to the Author**

1. **Review English. In general, the paper is well written but sometimes there are awkward sentences (p.e. the very first sentence in your abstract).**

check

1. **With such R&D spending, what types of innovations are being developed in Chile?**

That is the main point of the paper. The main source of technological progress is related to technological adoption from developed economies, rather that in-house R&D (Hoekman, Maskus, & Saggi, 2004); (UNCTAD, 2004). So, studying innovation activities in those economies is not achievable in the way it is studied in developed countries; that is, using the R&D spending. That is why is so important study it in a more broadly way, which is considering innovation expenditure defined as I do in the article.

Also, Chile is an interesting small developing country to study the innovation and exports relationship. The country experienced a very successful transformation in the last thirty years, many substantial economic reforms were implemented. For example, measures aimed boost competitive and open to the global economy. Despite the higher openness, investment in technological innovation in Chile remains small relative to more developed countries. Furthermore, it could be interesting to study other instance of innovations, rather than R&D, as I propose here.

1. **The way you cite is a bit awkward. I would recommend getting rid of the footnotes.**

check

1. **Pla-Barber and Alegre (2007) tackled the relevance of the type of industry: science based industries tend to be innovative and also ‘naturally’ global and therefore tend to export much more.**

I changed the main focus of the paper. Rather than focusing in a sector heterogeneity, what I am trying to do know is giving the emphasis to the difference between R&D and knowledge acquisition, given the relevance of international technology transfer for developing countries as Chile. Which it might be more interesting to an international journal as IMR. In any case, I read the paper and found interesting points of view, so I put it in the review.

1. **In p.10 you discuss about methods issues. This should be taken to your section 3.**

check

1. **Your conclusions should be better connected to your context (Chile), to the types of industries you are looking at and to the innovative profiles of the companies you have taken into account. I think you have got interesting findings for low-tech firms in emerging countries.**

check

1. **I would recommend developing further the conclusions. How does the literature change with the findings of your study?**

I do not remember any paper that study innovation expenditure in the broadly way that I do in my article, in particular for the case of developing countries. They are all trying to study it with the R&D which; is not the main mechanism of how firms are innovating (and also achieve exporting) in developing countries.

1. **A case study antecedent on the mutual causality issue between innovation and exports: R Chiva, P Ghauri, J Alegre (2014). Organizational learning, innovation and internationalization: a complex system model. British Journal of Management 25 (4), 687-705.**

I read the paper and I found some interesting points of view, so I put it in the review.

**Reviewer: 2**

**Comments to the Author**

**The paper is bringing into discussion an interesting topic which has been the focus of the most recent evidence in the literature: the causality between exports and innovation. However, after reading it, I do not see a clear contribution to the literature and anything novel in what theory and methodology refer to. It is practically a replied study but with another sample and slightly different objective (the introduction of productivity and more innovation variables). Questions to be considered for the authors:**

1. **Why Chile? Why is it really important? Which is you real contribution to the Chilean public policy and practitioners? It might be important and novel for Chile, but why should it be published in an international journal? Which is your main contribution?**

I changed the main focus of the paper. Rather than focusing in a sector heterogeneity, what I am trying to do know is giving the emphasis to the difference between R&D and knowledge acquisition, given the relevance of international technology transfer for developing countries like Chile. Which it might be more interesting to an international journal as IMR.

I worked on the (new) abstract based on this question. So, I think it is a quiet answer for it

The results show a difference in the causal direction between innovation and exports according to the type of innovation engaged, where the acquisition of knowledge shows a mutual reinforcement (reciprocal causality); rather than R&D expenditure, where causality is found from exports towards innovation (Learning-by-Exporting) and not in the opposite direction. Both, the former idea and the results, are important given that the main source of technological progress in developing countries is related to technological adoption from developed countries, rather that in-house R&D as in developed countries firms. My results show the relevance of the export information mechanism of foreign knowledge, given that encourage both the knowledge acquisition and R&D. In fact, this finding shows that the local markets in developing countries—even a middle size and open to international market as Chile—are at a reasonably distance from the technological frontier.

1. **Why so much emphasis on the use of different variables of innovation? I do agree it is important to consider a wide range so to better understand the hidden possible relations, but these are not explained at the end and neither are interpreted. Why these variables? Most of them are still inputs of innovation when the recent studies do highlight the importance to consider not only the input but the outputs as well. I do find a lack a theoretical support here.**

The emphasis is because firms in developing countries innovate, but not in a sophisticated-disruptive way like developed countries. They do not have large R&D departments and laboratories; rather, they adapt external knowledge and technology, in the form of patents, licence, and new machinery for innovation. They performs little improvements to their products in order to achieve new market requirements and expand, the change the shape of products and not their technical specifications. All those kind of activities are not focused in a laboratory like research, so it might be that, they have a totally different behaviour related to exports activities.

I do not consider innovation outputs because of the relevance of non-radical and technological innovations in developing countries. My innovation definition does not have technological constrains in form of product and processes, so it could be that main purpose of innovation efforts (R&D or acquisition of knowledge) do not have a radical innovation as their purpose (like new product or processes), but achieving an incremental innovation (Pavitt, What makes basic research economically useful?, 1991). The former could be a design-driven innovation do not necessarily related to functionality or novelty (Verganti, Design as brokering of languages: the role of designers in the innovation strategy of Italian firms, 2003) and (Verganti, Design, meanings and radical innovation: a meta-model and a research agenda, 2008). Also, using inputs of innovation (like innovation expenditures) rather than output (new products and process) could be suitable given the source of information. Surveys use categorical variables for output: new products and process which are less informative that level values of expenditures. Finally, is not guaranteed of an innovation effort and does not give information about heterogeneity of those efforts, in particular, information of the sophistication level of those innovation efforts. Studying innovation expenditures allows to analysis the innovation-export relationship in a case by case approach of sophistication level of those innovation efforts. This is all in the new definition of Innovation variables (line 396).

1. **The literature review needs more exhaustive analysis and this would lead to a better support of your ideas. There are papers missing, such as the ones of Cassiman and Golovko or Golovko and Valentini.**

check

1. **No clear hypotheses stated based on theory.**

(line 56) How change the Innovation-exports causal behaviour in developing countries if considering R&D or acquisition of knowledge?

1. **Upon which criteria were the sectors classified? (Table 1)**

That is the classification used by the Central Bank of Chile. Anyway, I removed from the paper.

1. **In my opinion, too many descriptives and not a real methodological contribution.**

Methodology contribution is not a purposes in my work. The main purposes is answer the question: How change the Innovation-exports causal behaviour in developing countries if considering R&D or acquisition of knowledge? Anycase, I removed some stats.

1. **Why do you decide to use one lag in the Granger test while Filipescu and al. employed 2 lags? Which is the justification?**

Data constrains of the survey. Statistics government institutions do not offer a time series panel database. There is a survey with waves of 2 years data (only one lag) which I take to constructs a pool.

1. **The tables of results are presented in a too simple way. Instead of using +/- or Yes/No the real values and significance would have been placed. You do provide a table of results for every innovation variables, but you do not interpret these results and provide an enriching image.**

The main focus here is study the question: How change the Innovation-exports causal behaviour in developing countries if considering R&D or acquisition of knowledge? In that sense, p-values and +/- are enough. Study the coefficients separately is out of the scope of the paper, and I don’t see the main benefit of put them. For the other question, I delete some out of scope material.

1. **In Conclusions, you refer to the hypotheses, but as mentioned above, they are not formulated as such in the paper. You do not present any discussion of your results and link them with previous ones, or provide clear future lines of research and limitations.**

check

**Reviewer: 3**

**Comments to the Author**

**The study asks some important questions about the relationship between innovation and exporting activities and productivity. That said, the paper has a number of issues that ….**

1. **The study is very specifically contextualised in Chile – how might this study offer insights beyond this case context?**

Given that my main focus is answer: How change the Innovation-exports causal behaviour in developing countries if considering R&D or acquisition of knowledge? In order to answer this question, Chile is an interesting small developing country to study. The country experienced a very successful transformation in the last thirty years, many substantial economic reforms were implemented. For example, measures aimed boost competitive and open to the global economy. Despite the higher openness, investment in technological innovation in Chile remains small relative to more developed countries. Furthermore, it could be interesting to study other instance of innovations, rather than R&D, as I propose here. And Chile, despite its openness to knowledge from global market, did not has pursued R&D innovations.

1. **The write up of the theoretical contribution needs to be much stronger – on pgs 2 and 3 the contribution put forward is not sufficiently focused on this – e.g. the first contribution is argued to be about increasing the amount of companies to be studied – and not particularly well articulated – i.e. why does examining a greater amount of information (1995-2012) offer a significant benefit other than being more years than other studies published to date – which is not a reason in and of itself for why this is a good thing. The write up in the conclusion also needs strengthening.**

check

1. Linked to the point above, based on some of the statements written within the paper – it seems that this is mainly a replication of a combination of two studies in the Chilean context – which might well be novel and important for Chile, but what about wider usefulness – if this is the case then this is not enough to warrant publication in IMR.

I think that results could be generalized to a wide range of developing countries, which is a contribution by its own. Export-innovation relation behaviour are quite different in developed and developing countries. One of the main arguments in that line is that, in developing countries, the main source of technological progress is related to technological adoption from developed economies, rather that in-house R&D (Hoekman, Maskus, & Saggi, 2004); (UNCTAD, 2004).In that sense, firms in those countries use acquisition and adaptation of knowledge for catching-up the technology frontier.

So, studying innovation activities in those economies is not achievable in the way it is studied in developed countries; that is, using the R&D spending. Innovation-export causality behaviour is mainly study by R&D expenditures. And that is fine, as long as the data comes from developed countries. So, it is difficult to extrapolate those conclusions to developing countries.

The case of Chile is interesting; because, despite its openness to knowledge from global market, the country did not has raised its R&D innovations.

4) The theoretical arguments put forward for export causality towards innovation – and particularly productivity require strengthening.

check

5) Section 2.2 on Innovation and export causality towards productivity is very confusing as it is written.

check

6) The bulk of the writing in 2.3 is not specifically about mutual reinforcement – but rather arguments that should have appeared earlier in sections 2.1 or 2.2. You also make a very contentious statement about imitating innovations being difficult – which is countered in literature on follower advantages.

In the context of developing countries, there are few firms prepared to achieve catch-up to the technology frontier, so mainly are just followers. Non-followers are hardly founded in developing countries. So, those who are able to participate in global markets in a sustained way are those few that are capable of adapt or imitate innovations from developed countries competitors.

7) I would embed the evidence for Chile within the correct theoretical sections as this section only serves to highlight the contextually specific nature of your study.

I added a new section in the revision that take account to the literature from developing countries, given that this is the focus. A great amount of that literature is from Chile

8) The literature review is very descriptive and lacks synthesis and critical evaluation – and just seems to peter out – rather than finish with any clear learnings/hypotheses for the primary research. This would be supported by starting your methodology section with a new heading to clearly differentiate the two sections.

check

9) You need to offer more in the methodology too – it is very descriptive and superficial in places.

I added a great amount of definition in order to enrich that part.

10) on pg 9 - you need to explain more clearly why you blend the analytical approaches and what this adds to your research over extant literature.

check

11) You need to explain why you have considered these specific types of innovation expenditure and how they are measured/how these variables have been created – e.g. is Acquisition of External Knowledge for Innovation (know) – made up as an aggregate measure of scores for patents, licences, etc?

12) Why do you use a one year lag in the Granger test while Filipescu and al. used a 2 year lag.

This is because of the construction of the survey.

13) You need to explain the inclusion/relevance of Foreign Property – it just seems to appear.

check

14) You should avoid using the term ‘confirm’ linked to your study findings – e.g. pg 13.

check

15) I am slightly confused as to why ‘Wood’ with the larges difference of means showed a non-significant difference.

I deleted the subsector analysis. That is not part of the focus anymore.

16) Footnote 27 refers to ‘existing literature’ but does not point the reader to even one example of the literature that is being drawn on here.

check

17) I found figures 2, 3 etc quite difficult to read because of the different order of sub-sectors – I know they are presented in order of size but that makes comparing across awkward.

Deleted

18) Is exporting propensity really a measure of sales ‘intended’ for foreign markets – how might this related to actual sales in foreign markets? You might need at least to note this as a potential issue/limitation.

I did not understand this comment.

19) I also found the table headings difficult to understand – e.g. table 7 is supposed to be about exports towards innovation at aggregate level – and the heading says Innovation Effort [general innovation] – so assume that you are only discussing the outcome (towards innovation) and that the brackets highlight the type of innovation. But in Table 8 – the heading then is about Export Intensity but the bracket hasn’t changed – it still says [General innovation]. Then why do you follow table 8 with table 9 – technological innovation towards export – with 10 then being the equivalent of table 7 but for technological innovation – I would follow a consistent order with these and clarify the headings better.

check

20) The conclusions, managerial implications, and further research need strengthening – they were all somewhat light (or non-existent – re: further research) – you need to explain what this means for Chile and wider – and link much more strongly to theory and what this study adds to knowledge.

check

21) The paper would benefit from a thorough proof-read throughout. It was mostly well-written but there were some awkward sentences and slightly odd terms used.

check

22) You need to look at your referencing style – they should not be footnotes.

check