

Referee report: "Are R&D Subsidies Effective? The Effects of Industry Competition", Xiang Xin

Summary:

The paper asks the interesting and important question of the effect of subsidies on private R&D investment. In particular, it wishes to know whether subsidies crowd out private investment or crowd it in. The paper briefly outlines some relevant theories and related literature before conducting an empirical investigation of a large set of Chinese firms for the period 2000-2016. It is found that R&D subsidies and R&D private investment are complements, but that "thresholds" in competition exist where subsidies become more effective at higher or lower competitive thresholds, resulting in a U-shaped relationship. The paper is quite short.

Comments:

1. Subsidy policy is quite institution-specific, often with requirements for eligibility for subsidies or tax breaks for certain classes of firms or industries, depending on the priorities of government. Small and medium sized entities, industries such as defence or pharmaceuticals, and other criteria often determine the allocation of subsidies. This paper discusses the subsidy and tax break policies in China very little, so that it is difficult to tell whether the results that are found are simply the result of the design of the original policy, lobbying, or other institutional features. Additional institutional information would aid in interpreting the results.
2. The R&D measure is only internal R&D spending, so that it does not capture any effect of subsidies generating the wherewithal for companies to go out to private markets and obtain loans, venture capital or any other type of funding. While the interpretation in the text sometimes appeals to other papers that have found a complementarity that possibly leads to a stronger private sector profile to obtain external funding, this is not actually supported directly in the text. Indeed, it would be helpful to have a more targeted interpretation of what the correlation displayed in the results means for incentives or behaviour.
3. While instruments are used to attempt to disentangle causal from correlation effects, these are not rigorously tested and alternative regressions that do not rely on instruments but could possibly be used to uncover causation are not investigated. This left me quite uncomfortable with a causal interpretation, which is much the one adopted in the paper. I would like to see a much stronger defence of the instruments chosen, as they do not strike me as "naturally" conforming to the standard requirements of exogeneity. For example, if certain industries are favoured recipients of aid, would a median for the industry as a whole be a good instrument for an individual firm within that industry? This is unclear to me and would need to be argued more tightly. Lags could perhaps be used as an additional test of this.
4. Indeed, more investigation of the spread of individual subsidies around the chosen instrument might help to disentangle what is going on in terms of correlation.
5. Similarly, one wonders if thresholds are partly due to institutional features of subsidy or tax break eligibility. Again, this would need to be argued more tightly. Whether some kind of underlying incentive or behavioural "truth" that goes beyond China and beyond the years in question was

unclear to me upon reading this brief piece. I was unclear about the selection of thresholds and their number. Some of the thresholds are very close to each other in magnitude.

6. While the mean levels of all the variables are discussed in the text, little interpretation is placed on these. It struck me that some of the levels were quite high or quite low, and I wondered if this was indicative of any “special” characteristics of the sample that could aid the reader in knowing whether this is a result that is specific to the dataset or more general. It would be nice to have an interpretation (this is high, this is low, this is similar to another study...) of these summary statistics as part of the text.
7. The basic theoretical arguments are targeting R&D within industry effects: in other words, R&D put toward developing an existing market. The R&D that is included in the study includes any R&D by the firms, including in diversification efforts or efforts that contribute to markets that may be largely the province of a parent company (in the case of multinationals). As such, it was hard for me to link the results specifically to the Schumpeterian or escape competition effects that are appealed to in the introduction. These strike me as relating to perhaps a subset of the R&D data in this paper, but possibly not the R&D sample that is actually used. It would be nice to have a breakdown of the data into diversification, process, or product oriented R&D in order to interpret the results more easily.
8. The finding of more internal R&D spending being associated with more subsidy/tax activity needs an interpretation on its own, since this is not directly related to existing work discussing the importance of subsidies in getting external funding. Is there theory that you wish to bring to bear that is more directly related to internal funding incentives? How, precisely, would you describe the incentives for internal investment in the presence of subsidies? I found that channels and mechanisms were not discussed enough in the paper, so the message was a bit unclear.
9. Some of the empirical effects are very small and some of the thresholds seemed extremely close together. In other words, while you find a complementarity, at times this is at an extremely small magnitude. Could you discuss more what the magnitudes of the coefficients mean and to what extent the complementarity is “strong” as you state in the introduction if the actual coefficients are quite small? Putting a monetary value on the coefficients might be helpful to interpret the magnitudes.
10. Could you describe your profit measure more precisely? It was not clear to me how this was measured.
11. Scotchmer has a textbook (Innovation and Incentives, 2006, MIT Press) that could perhaps help to frame the arguments about subsidies and “picking the winner”. Think about referencing Aghion’s work on debt as a “spur” to innovation on page 5, middle.
12. Just to be sure – you mean .029% and so on (page 8)? This is very small. That page has a lot of very small percentage figures. If this is really the magnitude, could you comment on its “economic significance” as opposed to the statistical significance?
13. In specific comments, there are a few awkward places on the English. It might be worthwhile at a final read stage, to have someone go over the manuscript for smoothness. Paragraphs top and middle of page 4,