Dear editors and reviewers,

Thanks for your letter and comments on my manuscript titled "Are R&D Subsidies Effective? The Effects of Industry Competition". These comments helped me improve my manuscript, and provided important guidance for future research.

I have addressed the reviewers' comments to the best of my ability. The main comments and my responses are detailed below:

1. **The specifications of the empirical model on P. 5 are not accurate.**

Thanks for the reminder of some mistakes in my baseline model description. Accoding to the explanation of the subscripts i and t, i reflects firm and t denotes time. So, as pointed by reviewer, the simbol β_i in equation (1) should be corrected as β_x, and $Subsidies_{i,t}$ should be corrected as $Subsidies_{j,t}$, in which j reflects the variation of industry level.

However, I view that the natural order to present the results is to show the ones that do not correct for self-selection bias first, and then move to the results with subsidy proxy (industry mean) that corrects for the self-section bias.

Thanks for reviewer's suggestion, and I will change the order in my revised edition.

2. **It is not clear to me whether your regression model is the reduced form or the second stage regression.**

The regression model is actually the reduced form. That is, I regress the industry average subsidies on individual firms' R&D expenditures. I will explain why I use this reduced form, in the next section. In fact, threshold regression is not a fully developed methodology, but it can explain my research problem accurately. The main drawback of this method is that it fails to cope with the endogenous problem sometimes. Although some economists try to cope with this problem in recent years, some practical problems still exist.

3. Clausen (2009)' s instrumental variables (IV) regression and the differences between Clausen (2009)' s model and equation (1).

Clausen (2009) discusses the subsidies' effect on firm' R&D expenditures. He regresses the government subsidies on firms' internal R&D expenditures, which subtracts the government subsidies from total R&D expenditures, and some control variables such as firm size, firm age, wether firm is a group affiliate and so on. In my paper, equation (1) uses the definition of internal R&D expenditures and adds some financial control variables such as financial leverage. The major difference between the model of Clausen (2009) and the model of mine is the estimation process. Clausen (2009) estimates his regression using IV method. However, the problem that I addressed in this paper is competition's effect on R&D subsides effectiveness, that is R&D subsidies may lead innovation firms to increase their R&D spending but this effect may be determined by industry competition. The best way to solve this problem is through using threshold regression method. Threshold regression first gives us some turning points, such as the competition thresholds ($\hat{\propto}_1$ and $\hat{\propto}_2$ in table 3), and then regresses the subsidy's proxies on internal R&D expenditures respectively for each competition threshold level.

Even if threshold regression method is the best way to solve my problem, this method have many drawbacks. As metioned by reviewer, Hansen (1990) suggests a threshold regression method that can only be used to address the pooled data, that is Hansen (1990) does not take fixed effects into consideration. Then, Hansen (1999) puts forward an advanced methodology, which takes fixed effects into consideration (Stata 14 command xthreg, which is developed by professor Qunyong Wang, is used to conduct this estimation.). Hansen (1999)'s threshold method is also the method used in my paper. However, Hansen (1999) does not cope with the potential endogenous problem. This endogenous problem then is addressed by using GMM method. The GMM method is much similar to the IV method used in Clausen (2009)'s study. It also includes two steps, and the first step is the estimation of instrument. However, this advanced threshold-GMM method does not have official Stata command. Some personal commands are not open-resources, and others need a lot of modifications. The most important thing is that these commands are not published by Stata. For this reason, I go back to Hansen (1999) and use industry average of subsidies as a substitute for individual firms' subsidies.

4. **There is not a formal discussion of why the industry mean of natural logarithm of individual firms' R&D subsidies could correct for the self-selection bias. It might only transfer the endogeneity problem to the industry level. For example, government may pick industries where innovation is higher. Therefore, the proposed instrument may not correct the bias.**

Government actually selects industries depending on industry innovation, and it may reflect the relationship between industry subsidies and industry innovation. However, in this paper, I regress the industry subsidies on individual firms' R&D expenditures, that is the regression show us the relationship between industry subsidies and individual firms' innovation. In fact, some firms spend more on R&D but others spend less, even if the firms are in the same industry. The policies only subsidize industry firms spending more on R&D, such as some policies provide subsidy equals 10% of R&D expenditures. In this case, individual firms' R&D expenditures certainly have influence on individual firms' subsidy, but if we turn to the industry subsidies, the influence of individual firms' R&D spending on industry subsidies may decrease.

There may be a probability that firm R&D affects industry R&D and then impacts industry subsidies. However, the influence of firm R&D on industry R&D is small. So, when comparing with the possible influence on the firm subsidies, the impact on the industry subsidies is indirect and small. However, even if the impact of industry is small, I have also controlled this impact by using firm level fixed effects. Firm fixed effects control for the influence of firm characteristics, such as industry, on individual firms' R&D spending. That is, I controlled the possible impact of industry when conducting the regressions. In general, even if individual firms' R&D spending may have influence on industry subsidies, this influence is much smaller than the impact on individual firms' R&D subsidies. That is, industry subsidies may not be the best but may be a possible instrument.

5. **I do not understand why you do the following: "For robustness, the natural logarithm for the total subsidies allocated to industries is also employed as instrument variable." For me this is not a robustness check, but rather the same thing as you have done before. That is, if you average over all firms in one industry, then you should get the industry average.**

In table 4, the instrument employed in column (5) to (8) is natural log for the total subsidies allocated to industries. I find that the estimated coefficients are slightly different from those in column (1) to (4). Specifically, all the coefficients in column (5) to (8) are smaller than those in column (1) to (4). However, the reviewer's comment is also reasonable. In order to address the problem mentioned by reviewer, I use another subsidy proxy (one year lag of individual firms' R&D subsidies suggested by another reviewer) to address the potential endogenous problem. The table below reports results estimated by using this new proxy. The results in column (1) to (3) are in line with my main regression results.

	(1)	(2)	(3)	(4)
	Hhi-internal R&D	Hhi-total R&D	Margin-internal R&D	Margin-total R&D
Tests for threshold effect				
Single	0.020**	0.010**	0.000***	0.000***
Double	0.000***	0.000***	0.020**	0.000***
Triple	0.673	0.383	0.713	0.923
Threshold estimate				
First ($\hat{\alpha}_1$)	0.0592	0.0592	0.0516	0.0682
Confidence interval	(0.0530-0.0602)	(0.0588-0.0602)	(0.0513-0.0524)	(0.066-0.069)
Second ($\hat{\alpha}_2$)	0.0399	0.0399	0.0428	0.0494
Confidence interval	(0.0386-0.0411)	(0.0386-0.0411)	(0.0420-0.0435)	(0.0488-0.0498)
Estimated variables				
Subsidy				

I(Mon$\leqslant \hat{\alpha}_1$)	0.006*	0.023***	0.025***	0.058***
	(1.79)	(6.46)	(13.17)	(29.71)
I($\hat{\alpha}_1$<Mon<$\hat{\alpha}_2$)	0.060***	0.092***	0.045***	0.027***
	(18.20)	(25.15)	(14.49)	(10.81)
I(Mon$\geqslant \hat{\alpha}_2$)	0.015***	0.034***	0.005**	0.001
	(9.12)	(18.49)	(2.54)	(0.37)
Constant	-1.446***	-2.392***	-1.366***	-2.412***
	(-4.91)	(-7.25)	(-4.62)	(-7.33)
Control variables	Yes	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes	Yes
Obs.	14416	14416	14416	14416
R^2	0.034	0.082	0.038	0.095

6. Accordingly, the econometric model should look as follows:

$$\boldsymbol{R\&D_{i,t} = \beta_1 + \beta_2 Subsidy_{j,t} I(Com_{i,t} \leq \alpha_1) + \beta_3 Subsidy_{j,t} I(\alpha_1 < Com_{i,t} \leq \alpha_2) + \beta_4 Subsidy_{j,t} I(Com_{i,t} > \alpha_2) + \beta_x X_{i,t} + \varepsilon_{i,t}}$$

The threshold regression model should take the form that is suggested by reviewer, and the equation (1) is just a brief expression. Besides, these are some mistakes in table 4 and 5. Thanks for the reminder from reviewer, and I will correct these mistakes in my revised version.

7. 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.

Thanks for reviewer’s reminder. R&D subsidy policies in China are complex, but can be divided into two parts. The first part is nationwide subsidies. The most famous nationwide subsidy is additional deduction for R&D expenditure. Small high-innovation firms can enjoy 75% additional deduction for R&D expenditures. That is, for small high-innovation firms, 100 Yuan R&D expenditures can be treated as 175 Yuan and deduct from income when calculating enterprise income tax. The other part is province-level R&D subsidies. For example, Guangdong province provides firms operated in Guangdong province additional R&D subsidy. Specifically, the subsidy equals R&D expenditure times 10% when R&D expenditure is smaller than 5 million Yuan, while subsidy=500 thousand+(R&D expenditure-5 million) for the part that is higher than 5 million Yuan. Shandong province provides 10% additional subsidy for the R&D expenditures that have already been subsidized by additional deduction policy. In fact, all the provinces except for Tibet (I don't find any R&D subsidy policies, but there are only a few listed firms in Tibet.) have their own R&D subsidy policies. However, for my sample firms, the subsidies' detail shows us a wide range of subsidy sources, such as the R&D worker's training subsidy, patent application subsidy and interest subsidy and so on. In general, firms receive more general R&D subsidies rather than subsidies provided by certain subsidy programmes.

8. 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.

The internal R&D spending employed in this paper is suggested by Clausen (2009). Clausen (2009) subtracts the R&D subsidies from R&D expenditures, so the internal R&D spending captures firms' willingness to use their private financing channels to support R&D activities. The private financing channels include both external financing channels, such as debt financing and equity financing, and internal cash. For listed firms, equity financing and internal cash may be popular financing channels for R&D activities, since debt financing requires periodic cash outflow. Besides, I also use total R&D expenditures to sales ratio as R&D proxy. Total R&D expenditures include both private financing (e.g. loans, equity and cash) and public financing (public R&D subsidies). The results of total R&D expenditures (column (2), (4), (6) and (8) in table 4, and column (2) and (4) in table 5) are similar to those estimated by using internal R&D spending (other columns in table 4 and 5).

9. 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.

Typically, the instrument should relate to individual subsidies but does not be influenced by individual firms' R&D expenditures. R&D subsidy policies are often conducted in industry level, that is "certain industries are favoured recipients of aid" pointed by reviewer. So, individual firms' R&D subsidies indeed relate to industry subsidies. However, when comparing with industry R&D expenditures, individual firms' R&D expenditures have smaller influences on industry level variables such as industry R&D subsidies. This is because individual firms' R&D spending makes small contribution to industry R&D. For some industries, the largest individual R&D spending to industry R&D spending (total R&D spending of firms in industry) ratio is smaller than 10%. Some small firms even don't contribute to industry R&D expenditures. In general, the relationship between individual subsidies and industry subsidies is strong, while the influence of individual R&D on industry subsidies is weaker. So, as mentioned in previous section, industry mean of R&D expenditures may be a possible instrument.

In addition, thanks for the recommendation of reviewer, and I also conduct the regressions using one year lag of individual R&D subsidies. The regression results are presented in the table above. The results are similar to those in my paper.

10. I was unclear about the selection of thresholds and their number. Some of the thresholds are very close to each other in magnitude.

The determination of threshold number is a step of threshold regression. The threshold method first ranges the industry competition variables, and then tests if the competition value is a turning point. The turning point will be found when the coefficient of the main regression, which reflects the relationship between R&D subsidies and R&D expenditures, has significant changes. That is, the coefficient of the main regression significantly changes when competition reaches a certain point, and this point will be called threshold. In this paper, table 2 shows us the threshold selection process. In table 2, the P-value of single threshold tests are all smaller than 10%, indicating that there are at least one threshold. So, we should test for two thresholds. The P-value of double threshold tests are also smaller than 10%, indicating that two thresholds are also possible. However, the threshold tests stop at the third level. The P-value of triple threshold tests are larger than 10%, indicating that two thresholds are more proper.

Table 3 shows the thresholds and their 95% confidence intervals. The best threshold should be the one that is strictly included in the confidence interval. Some of the thresholds are close to each other. This actually indicates that inverted U shape are skewed, and the peak of inverted U is on the left of the mean of competition proxy. This result indicates that the R&D subsidies' efficiency increases more quickly when market competition becomes weaker. In fact, Chinese firms, especially some small firms, are not willing to engage in innovation, they fetishize some developed technologies. In this case, the technologies employed by industry firms are similar to each other and the market competition are intense. However, the firms that are willing to engage in R&D, such as firms that tend to improve the technologies that are widely employed by competitors, will benefit more from R&D, and then market competition becomes weaker. This is why subsidies' efficiency increases more quickly when competition becomes weaker.

11. While the mean levels of all the variables are discussed in the text, little interpretation is placed on these.

Thanks for the reminder from reviewer, and I will add the interpretation of summary statistics into my revised edition. Table 1 shows that the mean level of R&D proxies are small, since Chinese firms' R&D incentive is quite low, and most of the sample firms even do not engage into R&D activities and their R&D expenditures are zero. The mean natural log of individual firms' subsidies is 7.436, which is much smaller than the mean of the natural log of close to the market subsidy (part of the public R&D subsidies, and the mean of natural log of close to the market subsidy is 1938.9) in Norway in 2002 (Clausen, 2009)…

12. 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.

Thanks for reviewer's suggestion, and it is really interesting to divide the R&D expenditures into process and product oriented R&D. However, the R&D expenditures used in this paper is from the financial report of firms in Chinese A-share market. The accounting standard in China requires the firms to record the spending relating to R&D activities, such as the wages of R&D workers, as expensing in the first stage, and then record the R&D spending as capital when R&D activities are less risky and may have opportunity to apply for patents. The R&D spending in these two stages are called R&D expenditure in financial report. In this case, it is hard for me to separate the process spending from product oriented spending, since R&D expenditure is only a pooled accounting item. In fact, financial report itself does not show us the detail of R&D expenditure. The detail occasionally can be found in audit report, but most of the audit reports don't have the detail either.

13. 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.

According to Clausen (2009), the R&D activities have two main sources of financing channels, that is the public financing channel and the private financing channel. The public financing channel indicates the public subsidies received by individual firms, and the private financing channel includes all the private channels through which firms can get access to the financing (e.g. loans, equity and internal cash). Internal R&D spending subtracts the public financing (public subsidies) from total R&D spending, and it is a measure of private financing channels. So, this paper also discusses the effect of subsidies on firms' willingness to access external financing and use internal cash to support R&D.

Some literatures argue that public subsidy is a signal that can be used to easy innovation firms' financial constraint. Specifically, innovation activities that receive public support would be promising, and the investors who capture this signal would provide firms with cheaper financing. Cheap financing is crucial in encouraging firms to conduct R&D activities, so firms will increase their R&D spending. This is a possible channel through which subsidies increase firms' R&D spending. In addition, R&D smoothing requires firms to have a smooth path of financing, that is financing is crucial in conducting R&D activities. Public support provides firms with additional financing and then encourages firms to spend more on R&D. In addition to public financing, private financing is also a crucial source of R&D financing. According to pecking order theory, firms should first use internal cash to finance their investment programmes, so firms should also use internal cash to support their R&D programmes.

That is, subsidies will also increase firms' willingness to use internal cash to support R&D.

14. 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.

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

Table 1 shows the summary statistics, and we find that the mean level of R&D to sales ratio of sample firms is only 0.366% and the mean of internal R&D to sales ratio is 0.199%. The maximum internal R&D to sales ratio is 20.326%, and the maximum R&D to sales ratio is 25.725%. In fact, most of the sample firms don' have any R&D expenditures. If I only select the firms that have engaged in R&D, the mean internal R&D expenditures to sales ratio is merely 1.310%, and the mean R&D expenditures to sales ratio is 2.410%. In this case, the coefficient 0.015 in column (1) table 4, for example, indicates that 100% increases in R&D subsidies lead to average 0.015% increases in sample firms' internal R&D to sales ratio when HHI of industry sales is smaller than 0.0396. That is, if firms received average 1 Yuan subsidies before, an extra 1 Yuan subsidies now may lead to average 0.015% increases in internal R&D to sales ratio (The sample mean of firms' sales is 4.89*10^9 Yuan) or average 733.5 thousand Yuan (4.89*10^9/100*0.015) increases in internal R&D spending (The average subsidy received by sample firms is quite small, 7.436 comparing with 1938.9 in Norway in

2002 , so 100% increases in subsidies may be necessary.). This effect seems small, but it is 7.538% of the sample mean of internal R&D (0.015/0.199). That is, 4.89*10^9 Yuan average sales (the sample mean of sales) include nearly 9.7 million Yuan (4.89*10^9/100*0.199) internal R&D spending at the beginning, but 100% subsidies increases lead to average 733.5 thousand Yuan (4.89*10^9/100*0.015) increases in internal R&D spending. The increases in internal R&D are 7.5% of original average internal R&D spending. Then, the coefficient 0.046 indicates that 100% increases in R&D subsidies result in average 0.046% increases in sample firms' internal R&D to sales ratio or average 2.3 million Yuan increases in internal R&D spending, when HHI is larger than 0.0396 but smaller than 0.706. This effect is 23.116% of the sample mean of internal R&D ratio (0.046/0.199), and it is a strong effect. Finally, the coefficient 0.017 indicates that 100% increases in R&D subsidies lead to average 0.017% increases in internal R&D to sales ratio or average 831.3 thousand Yuan increases in internal R&D, when HHI is larger than 0.076. This effect is 8.542% of the sample mean (0.017/0.199). These results show that the effect of subsidies in the second stage (0.046) is stronger than those in the first and the third stages (0.015 and 0.017). Other columns in table 4 and 5 show the similar results, and the largest effects all appear in the second stage regressions. For example, in column (2), the coefficient 0.103 indicates that 100% increases in R&D subsidies lead to average 0.103% increases in firms' internal R&D to sales ratio. This effect is 51.759% of the sample mean (0.103/0.199).

Then the question is why the sample firms have such small average R&D to sales ratio. Bloomberg database shows that the average R&D density of firms in Chinese A-share market is only 1.406%. The sample employed in this paper is a subset of A-share market, which only includes the firms that have non-missing values for financial data (the requirement of threshold regression method). This kind of firms are quite mature, since they continue as going concern from 2000 to 2016. Mature firms typically have stable profit, so the R&D incentive of them may not be as high as young firms.

15. Could you describe your profit measure more precisely? It was not clear to me how this was measured.

First, individual firms' profit margin is the operating income to sales ratio, in which operating income equals operating revenue minus operating expenditures. Then, I calculate the industry median of individual firms' profit margin and employ it as a competition proxy.

16. 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.

I'm so sorry that I cannot find the full text of Scotchmer's textbook (Innovation and Incentives, 2006, MIT Press), but I attach the abstract:

> *Interest in intellectual property and other institutions that promote innovation exploded during the 1990s. Innovationand Incentives provides a clear and wide-ranging introduction to the economics of innovation, suitable for teaching at both the advanced undergraduate and graduate levels. It will also be useful to legal and economics professionals. Written by an expert on intellectual property and industrial organization, the book achieves a balanced mix of institutional details, examples, and theory. Analytical, empirical, or institutional factors can be given different emphases at different levels of study. Innovation and Incentivespresents the historical, legal, and institutional contexts in which innovation takes place. After a historical overview of the institutions that support innovation, ranging from ancient history through today's government funding and hybrid institutions, the book discusses knowledge as a public good, the economic design of intellectual property, different models of cumulative innovation, the relation of competition to licensing and joint ventures,*

patent and copyright enforcement and litigation, private/public funding relationships, patent values and the return on R&D investment, intellectual property issues arising from direct and indirect network externalities, and globalization. The text presents technical and abstract analysis and at the same time sheds light on current controversies and policy-relevant topics, including the difficulty of enforcing copyright in the digital age and international protection of intellectual property.

I find some interesting key words while reading this abstract. The first one is "knowledge as a public good". Before we introduce patent and copyright into our legal system, knowledge cannot be a private property and anyone who gets access to the knowledge can take advantage of it. In this case, everyone in the market shares the same knowledge base, no one has innovation incentive, and the market competition is intense. Then, we introduce a patent and copyright system, but the protection is not sufficient. That is, the competitors also have a few opportunities to use external knowledge without payment. In this case, the investors have their own knowledge property and the market competition decreases. However, investors should constantly update their technology so that they can prevent imitation, that is firms that tend to prevent imitation will have high innovation incentive. This argument explains the left part of Aghion's inverted U-shape. Then, I find another key word "public funds". When everyone shares the same knowledge base, innovation is not necessary, and R&D subsidies don't have any effect. However, the R&D subsidies will work when firms tend to prevent imitation and update their technology constantly.

. xthreg interd1 hhi1 logassets1 logsales1 salesgrow1 debtratio1, rx(l.logsubsidy1) qx(hhi1) thnum(2) bs(300 300) trim(0.005 0.005) grid(100>)

Estimating the threshold parameters: 1st ...... 2nd ...... Done

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	0.0592	0.0530	0.0602
Th-21	0.0530	0.0519	0.0533
Th-22	0.0399	0.0386	0.0411

Threshold effect test (bootstrap = 300 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	1.76e+04	1.2256	56.13	0.0200	37.7202	44.9344	62.1594
Double	1.74e+04	1.2106	177.79	0.0000	78.7424	103.4476	120.1843

Fixed-effects (within) regression Number of obs = 14416

Group variable: code Number of groups = 901

R-sq: within = 0.0414 Obs per group: min = 16

between = 0.0133 avg = 16.0

overall = 0.0342 max = 16

F(8,13507) = 72.86

corr(u_i, Xb) = -0.0624 Prob > F = 0.0000

interd1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
hhi1	.3631838	.1672519	2.17	0.030	.0353467	.6910208
logassets1	.0787082	.0159232	4.94	0.000	.0474964	.10992
logsales1	-.0083635	.0090906	-0.92	0.358	-.0261823	.0094553
salesgrow1	-.0208206	.0152715	-1.36	0.173	-.0507548	.0091135
debtratio1	-.1222004	.0521623	-2.34	0.019	-.2244459	-.0199549
_cat#cL.logsubsidy1						
0	.0057672	.0032213	1.79	0.073	-.0005471	.0120814
1	.0595733	.0032734	18.20	0.000	.053157	.0659896
2	.014783	.0016211	9.12	0.000	.0116055	.0179605
_cons	-1.445571	.2946499	-4.91	0.000	-2.023126	-.8680163
sigma_u	.51827295					
sigma_e	1.1360767					
rho	.17226371	(fraction of variance due to u_i)				

F test that all u_i=0: F(900, 13507) = 3.20 Prob > F = 0.0000

. xthreg exterd1 hhi1 logassets1 logsales1 salesgrow1 debtratio1, rx(l.logsubsidy1) qx(hhi1) thnum(2) bs(300 300) trim(0.005 0.005) grid(100>)

Threshold estimator (level = 95):

model	Threshold	Lower	Upper
Th-1	0.0592	0.0588	0.0602
Th-21	0.0530	0.0519	0.0533
Th-22	0.0399	0.0386	0.0411

Threshold effect test (bootstrap = 300 300):

Threshold	RSS	MSE	Fstat	Prob	Crit10	Crit5	Crit1
Single	2.22e+04	1.5433	81.38	0.0100	59.0092	65.8635	81.3063
Double	2.19e+04	1.5189	231.12	0.0000	143.3092	161.1090	185.5920

Fixed-effects (within) regression		Number of obs	= 14416
Group variable: code		Number of groups	= 90
R-sq: within	= 0.0974	Obs per group: min	= 16
between	= 0.0336	avg	= 16.0
overall	= 0.0823	max	= 16
		F(8,13507)	= 182.17
corr(u_i, Xb)	= -0.0803	Prob > F	= 0.0000

exterd1	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
hhi1	.3183253	.1873398	1.70	0.089	-.0488868	.6855374
logassets1	.1444987	.0178357	8.10	0.000	.1095382	.1794592
logsales1	-.0251897	.0101824	-2.47	0.013	-.0451486	-.0052307
salesgrow1	-.0410657	.0171056	-2.40	0.016	-.0745951	-.0075363
debtratio1	-.3076	.0584273	-5.26	0.000	-.4221257	-.1930743
0	.0233164	.0036082	6.46	0.000	.0162438	.03038
1	.0922094	.0036665	25.15	0.000	.0850225	.0993964
2	.033581	.0018158	18.49	0.000	.0300219	.0371402
_cons	-2.392458	.330039	-7.25	0.000	-3.03938	-1.745535
sigma_u	.59163004					
sigma_e	1.2725258					
rho	.17773705	(fraction of variance due to u_i)				

F test that all u_i=0: F(900, 13507) = 3.23 Prob > F = 0.0000

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. xthreg interd1 indusmargin1 logassets1 logsales1 salesgrow1 debtratio1, rx(l.logsubsidy1)
qx(indusmargin1) thnum(2) bs(300 300) trim(0.01 > 0.01) grid(100)
Threshold estimator (level = 95):
----------------------------------------------------
     model |    Threshold       Lower       Upper
-----------+----------------------------------------
      Th-1 |       0.0516      0.0513      0.0524
     Th-21 |       0.0494      0.0488      0.0498
     Th-22 |       0.0428      0.0420      0.0435
----------------------------------------------------

Threshold effect test (bootstrap = 300 300):
----------------------------------------------------------------------------
Threshold |       RSS        MSE      Fstat    Prob   Crit10    Crit5    Crit1
-----------+----------------------------------------------------------------
    Single |  1.75e+04     1.2172     157.92  0.0000  31.6874  37.4581  49.6349
    Double |  1.75e+04     1.2136      41.82  0.0200  28.3268  34.3145  51.3943
----------------------------------------------------------------------------
Fixed-effects (within) regression               Number of obs      =     14416
Group variable: code                            Number of groups   =       901
R-sq:  within  = 0.0384                         Obs per group: min =        16
       between = 0.0408                                        avg =      16.0
       overall = 0.0387                                        max =        16
                                                F(8,13507)         =     67.43
corr(u_i, Xb)  = -0.0144                        Prob > F           =    0.0000
----------------------------------------------------------------------------------
            interd1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+-------------------------------------------------------------
       indusmargin1 |   .4440344   .3046374     1.46   0.145    -.1530974    1.041166
         logassets1 |   .0758674   .0159348     4.76   0.000      .044633     .107101
          logsales1 |  -.0078803   .0090997    -0.87   0.387    -.0257169     .009956
         salesgrow1 |  -.0218851   .0153218    -1.43   0.153    -.0519181    .0081479
         debtratio1 |  -.1385775   .0528399    -2.62   0.009    -.2421511   -.0350038
_cat#cL.logsubsidy1 |
                  0 |   .0251499    .001909    13.17   0.000     .0214081    .0288918
                  1 |   .0450316   .0031069    14.49   0.000     .0389417    .0511215
                  2 |   .0049057   .0019295     2.54   0.011     .0011237    .0086877
              _cons |  -1.365511   .2953058    -4.62   0.000    -1.944352   -.7866704
--------------------+-------------------------------------------------------------
            sigma_u |  .50697849
            sigma_e |  1.1378318
                rho |  .16564357   (fraction of variance due to u_i)
F test that all u_i=0: F(900, 13507) = 3.04                  Prob > F = 0.0000
```

```
. xthreg exterd1 indusmargin1 logassets1 logsales1 salesgrow1 debtratio1,
rx(l.logsubsidy1) qx(indusmargin1) thnum(2) bs(300 300) trim(0.01
> 0.01) grid(100)
Threshold estimator (level = 95):
----------------------------------------------------
     model |   Threshold       Lower       Upper
-----------+----------------------------------------
      Th-1 |      0.0494      0.0488      0.0498
     Th-21 |      0.0494      0.0488      0.0498
     Th-22 |      0.0682      0.0661      0.0694
----------------------------------------------------
Threshold effect test (bootstrap = 300 300):
-----------------------------------------------------------------------------
Threshold |        RSS       MSE     Fstat    Prob   Crit10    Crit5    Crit1
-----------+-----------------------------------------------------------------
   Single |   2.18e+04    1.5162    331.10  0.0000  48.8909  54.6490  72.3956
   Double |   2.17e+04    1.5091     67.99  0.0000  39.7695  44.0223  59.4568
-----------------------------------------------------------------------------
Fixed-effects (within) regression               Number of obs      =     14416
Group variable: code                            Number of groups   =       901
R-sq:  within  = 0.1032                         Obs per group: min =        16
       between = 0.0699                                        avg =      16.0
       overall = 0.0952                                        max =        16
                                                F(8,13507)         =    194.34
corr(u_i, Xb)  = -0.0665                        Prob > F           =    0.0000
------------------------------------------------------------------------------------
            exterd1 |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------------+---------------------------------------------------------------
       indusmargin1 |   .9202361   .3378513     2.72   0.006     .2580003    1.582472
         logassets1 |    .143467   .0177608     8.08   0.000     .1086533    .1782808
          logsales1 |  -.0230501   .0101443    -2.27   0.023    -.0429344   -.0031658
         salesgrow1 |  -.0419972   .0170816    -2.46   0.014    -.0754796   -.0085148
         debtratio1 |  -.3420529   .0589096    -5.81   0.000    -.4575238   -.2265819
_cat#cL.logsubsidy1 |
                  0 |   .0576053   .0020068    28.71   0.000     .0536717    .0615388
                  1 |   .0269331   .0026467    10.18   0.000     .0217451      .03212
                  2 |   .0010104   .0027367     0.37   0.712    -.0043538    .0063747
              _cons |  -2.412475    .329091    -7.33   0.000    -3.057539    -1.76741
--------------------+---------------------------------------------------------------
            sigma_u |  .57693735
            sigma_e |  1.2684074
                rho |  .17142416   (fraction of variance due to u_i)
F test that all u_i=0: F(900, 13507) = 3.09                 Prob > F = 0.0000
```