Are Incentives for R&D Effective? Evidence from a Regression Discontinuity Approach

Stata program

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The Stata dataset and program (Stata version 11.2 for Windows) allow to replicate the econometric exercises reported in the published paper. For confidentiality reasons some information, like firm's fiscal code and those on bank credit sourced by the Bank of Italy, cannot be provided.

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*****************************************************************************************************
********************* Variables in the dataset *****************************************************
*****************************************************************************************************
```

Capital
K= pre-program total capital (one year before the program)
KT= pre-program tangible capital (one year before the program)
KINT= pre-program intangible capital (one year before the program)

Sales and assets
SALES= pre-program sales (one year before the program)
ASSETS= pre-program total assets (one year before the program)

Investment
INV= total investment accumulated over the post-program period (the year of the auction and two years after)
INVT= tangible investment accumulated over the post-program period (the year of the auction and two years after)
INVINT= intangible investment accumulated over the post-program period (the year of the auction and two years after)

LINV=LOG(INV+1+min(INVi))
LINVT=LOG(INVT+1+min(INVTi))
LINVINT=LOG(INVINT+1+min(INVINTi))

Investment over sales
INVSALES= INV/SALES
INVTSALES= INVT/SALES
INVINTSALES= INVINT/SALES

Investment over capital
INVK= INV/K
INVTK= INVT/K
INVINTK= INVINT/K

Investment over assets
INVA=INV/ASSETS
INVTA=INVT/ASSETS
INVINTA=INVINT/ASSETS

Labor and service costs
LC= labor costs accumulated over the post-program period (the year of the auction and two years after)
SC= service costs accumulated over the post-program period (the year of the auction and two years after)
LCSALES= LC/SALES
SCSALES= SC/SALES

Employment and wages
EMPL= Number of employees accumulated over the post-program period (the year of the auction and two years after)
WAGE= LC/EMPL
LWAGE=log(WAGE)

others
treat = 1(treated firms)
notreat = 1 (untreated firms)
SMALLM= 1(SMALL FIRMS)
LARGEM= 1(LARGE FIRMS)

CR= Coverage ratio =(grant/planned investment)
HIGH=1(HIGH CR)
LOW=1(LOW CR)
AGE= FOUNDATION YEAR
FIRM=firm code

****
***************************** STATA program for the regressions **********************************
***************************** (Stata Version 11.2 for Windows)   **********************************
****

****
********* Variables for baseline regressions ************************
****
gen s=score-75
gen s2=s^2
gen s3=s^3

gen streat=s*treat
gen streat2=s2*treat
gen streat3=s3*treat

gen notreat=1-treat
gen snotreat=s*notreat
gen snotreat2=s2*notreat
gen snotreat3=s3*notreat

****
******* 1. Baseline (Table 3-4) **
****

***full sample pol=0 (polynomial of zero degree)
reg INVSALES treat   , cluster(score)
est store A
est stats
***pol=1 (polynomial of degree one)
reg INVSALES treat snotreat streat   , cluster(score)
est store A
est stats
***pol=2 (polynomial of degree two)
reg INVSALES treat snotreat snotreat2 streat streat2   , cluster(score)
est store A
est stats
***pol=3 (polynomial of degree three)
reg INVSALES treat snotreat snotreat2 snotreat3 streat streat2 streat3 , cluster(score)
est store A
est stats

*local estimates 50%
reg INVSALES treat   if score>51 & score<81, cluster(score)
est store A
est stats
reg INVSALES treat snotreat streat   if score>51 & score<81, cluster(score)
est store A
est stats
reg INVSALES treat snotreat snotreat2 streat streat2 if score>51 & score<81, cluster(score)
est store A
est stats

```
*local estimates 35%
reg  INVSALES treat                              if  score>65 & score<79, cluster(score)
est store A
est stats
reg  INVSALES treat snotreat streat          if score>65 & score<79, cluster(score)
est store A
est stats
reg  INVSALES treat snotreat snotreat2 streat streat2 if score>65 & score<79, cluster(score)
est store A
est stats




********************************************************************************
********* 2. Small-large firms  (Table 5) *************************************
********************************************************************************


** variables for the regressions
gen ssmall=s*smallm
gen ssmall2=s2*smallm
gen ssmall3=s3*smallm
gen slarge=s*largem
gen slarge2=s2*largem
gen slarge3=s3*largem

gen treatsmall=treat*smallm
gen streatsmall=s*treat*smallm
gen streatsmall2=s2*treat*smallm
gen streatsmall3=s3*treat*smallm
gen treatlarge=treat*largem
gen streatlarge=s*treat*largem
gen streatlarge2=s2*treat*largem
gen streatlarge3=s3*treat*largem


******* regressions *****************
******* full sample
reg INVSALES  largem treatsmall treatlarge                    , cluster(score)
est store A
est stats
reg INVSALES largem treatsmall treatlarge ssmall slarge streatsmall streatlarge   , cluster(score)
est store A
est stats
reg INVSALES largem treatsmall treatlarge ssmall slarge ssmall2 slarge2 streatsmall streatlarge streatsmall2 streatlarge2  ,
cluster(score)
est store A
est stats
reg INVSALES largem treatsmall treatlarge ssmall slarge ssmall2 slarge2 ssmall3 slarge3 streatsmall streatlarge streatsmall2
streatlarge2 streatsmall3 streatlarge3  , cluster(score)
est store A
est stats

*local estimates 50%
reg INVSALES  largem treatsmall treatlarge        if score>51 & score<81, cluster(score)
est store A
est stats
reg INVSALES largem treatsmall treatlarge ssmall slarge streatsmall streatlarge   if score>51 & score<81, cluster(score)
est store A
est stats
reg INVSALES largem treatsmall treatlarge ssmall slarge ssmall2 slarge2 streatsmall streatlarge streatsmall2 streatlarge2  if score>51
& score<81, cluster(score)
est store A
est stats
```

```
*local estimates 35%
reg INVSALES  largem treatsmall treatlarge        if score>65 & score<79, cluster(score)
est store A
est stats
reg INVSALES largem treatsmall treatlarge ssmall slarge streatsmall streatlarge   if score>65 & score<79, cluster(score)
est store A
est stats
reg INVSALES largem treatsmall treatlarge ssmall slarge ssmall2 slarge2 streatsmall streatlarge streatsmall2 streatlarge2  if score>65
& score<79, cluster(score)
est store A
est stats



*******************************************************************************
********* 3. Coverage ratio (Table 6) ********************************************
*******************************************************************************
** high and low  coverage ratio
gen    high=1      if CR>.4043 & treat==1
replace high=0   if CR<=.4043 | treat==0
gen    low=1       if CR<=.4043 & treat==1
replace low=0     if high==1 | treat==0

** variables for regressions
gen treath=treat*high
gen streath=s*treath
gen streath2=s2*treath
gen streath3=s3*treath
gen treatl=treat*low
gen streatl=s*treatl
gen streatl2=s2*treatl
gen streatl3=s3*treatl



**************** regressions ************************
******* full sample
reg INVSALES treatl treath                                  , cluster(score)
est store A
est stats
reg INVSALES treatl treath snotreat streatl streath          , cluster(score)
est store A
est stats
reg INVSALES treatl treath snotreat snotreat2 streatl streatl2 streath streath2, cluster(score)
est store A
est stats
reg INVSALES treatl treath snotreat snotreat2 snotreat3 streatl streatl2 streatl3 streath streath2 streath3    , cluster(score)
est store A
est stats

*local estimates 50%
reg INVSALES treatl treath                                  if score>51 & score<81, cluster(score)
est store A
est stats
reg INVSALES treatl treath snotreat streatl streath  if score>51 & score<81, cluster(score)
est store A
est stats
reg INVSALES treatl treath snotreat snotreat2 streatl streatl2 streath streath2     if score>51 & score<81, cluster(score)
est store A
est stats


*local estimates 35%
reg INVSALES treatl treath             if score>65 & score<79, cluster(score)
est store A
est stats
reg INVSALES treatl treath snotreat streatl streath  if score>65 & score<79, cluster(score)
est store A
est stats
reg INVSALES treatl treath snotreat snotreat2 streatl streatl2 streath streath2     if score>65 & score<79, cluster(score)
est store A
est stats
```

```
*****************************************************************************
**** 4. Age: young firms (=fchighm) and old firms (=fclowm) *****  (Table 6) **************
*****************************************************************************

** young and old firms
gen    fclowm=1   if AGE<1987.081      & AGE!=.
replace fclowm=0  if AGE>=1987.081     & AGE!=.
gen    fchighm=1  if AGE>=1987.081     & AGE!=.
replace fchighm=0 if AGE<1987.081      & AGE!=.

** variables for regressions
gen sfclow=s*fclowm
gen sfclow2=s2*fclowm
gen sfclow3=s3*fclowm
gen sfchigh=s*fchighm
gen sfchigh2=s2*fchighm
gen sfchigh3=s3*fchighm

gen treatfclow=treat*fclowm
gen streatfclow=s*treat*fclowm
gen streatfclow2=s2*treat*fclowm
gen streatfclow3=s3*treat*fclowm
gen treatfchigh=treat*fchighm
gen streatfchigh=s*treat*fchighm
gen streatfchigh2=s2*treat*fchighm
gen streatfchigh3=s3*treat*fchighm

******* regressions *****************
******* full sample
reg INVSALES  fclowm treatfchigh treatfclow                       , cluster(score)
est store A
est stats
reg INVSALES fclowm treatfchigh treatfclow sfchigh sfclow streatfchigh streatfclow   , cluster(score)
est store A
est stats
reg INVSALES fclowm treatfchigh treatfclow sfchigh sfclow sfchigh2 sfclow2 streatfchigh streatfclow streatfchigh2 streatfclow2  ,
cluster(score)
est store A
est stats
reg INVSALES fclowm treatfchigh treatfclow sfchigh sfclow sfchigh2 sfclow2 sfchigh3 sfclow3 streatfchigh streatfclow
streatfchigh2 streatfclow2 streatfchigh3 streatfclow3  , cluster(score)
est store A
est stats

*local estimates 50%
reg INVSALES  fclowm treatfchigh treatfclow   if score>51 & score<81, cluster(score)
est store A
est stats
reg INVSALES fclowm treatfchigh treatfclow sfchigh sfclow streatfchigh streatfclow   if score>51 & score<81, cluster(score)
est store A
est stats
reg INVSALES fclowm treatfchigh treatfclow sfchigh sfclow sfchigh2 sfclow2 streatfchigh streatfclow streatfchigh2 streatfclow2  if
score>51 & score<81, cluster(score)
est store A
est stats

*local estimates 35%
reg INVSALES  fclowm treatfchigh treatfclow   if score>65 & score<79, cluster(score)
est store A
est stats
reg INVSALES fclowm treatfchigh treatfclow sfchigh sfclow streatfchigh streatfclow   if score>65 & score<79, cluster(score)
est store A
est stats
reg INVSALES fclowm treatfchigh treatfclow sfchigh sfclow sfchigh2 sfclow2 streatfchigh streatfclow streatfchigh2 streatfclow2  if
score>65 & score<79, cluster(score)
est store A
est stats
```