Replication and Review of Cremers, Pareek and Sautner (2016): Short-term Investors, Long-term Investments, and Firm Value

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Abstract

We replicate and review the main results of Cremers, Pareek and Sautner (2016), who argue that the entry of short term investors causes target firms to cut long term investments, in order to generate positive earning surprises and temporarily boost the firm valuation in the market. The paper uses a firm's Russell 2000 index entry, which it claims to be an exogenous shock pumping short-term demand into the firm, as the instrument for investment horizon to identify its causal effect on R&D, earnings and valuation. We focus on replicating the main causal regressions, and capture some of the significant results while not on others. Meanwhile, we address our concerns for the identification problem. Specifically, the Russell 2000 index entry may not be a perfect instrument for stock duration, a proxy of investment horizons. It may not be perfectly exogenous with potential relation to firms' management decisions; it may also fail to address the potential measurement error problem of stock duration. These concerns lead to our suspicion in the conclusion of the paper.

1. Introduction

We review Cremers, Pareek and Sautner (2016, henceforth CPS), who attempt to answer the question whether the inflow of short-term investments pushes the firm to pursue short-term goals at long-term costs. A large body of literature discusses short-termism, including the theory paper of Bolton, Scheinkman and Xiong (2006, henceforth BSX), which predicts that short-term investors may push firms to cut long-term investments, in order to generate positive earning shocks and thus temporary valuation boosts. CPS largely investigates this story in US small-cap equity data, by examining how investment horizons, proxied by an invented stock duration measure, may affect firms' R&D, earnings and valuation ratios.

The major challenge of the investigation is causal identification. According to CPS, the stock duration is an endogenous variable, because it may depend on unobserved fundamentals like investment opportunities and the information environment. To address this issue, CPS looks at firms that enter the Russell 2000 index from outside Russell 3000, and use the index entry indicator as an instrument variable. CPS argues that the entry of Russell 2000 index is exogenous, since the entry solely results from change in valuation, which is largely random and independent of the fundamentals. Meanwhile, CPS also claims to document the effect of the index entry and the inflow of short-term investors. Hence they view the index entry as a legitimate instrument variable and use it in a 2SLS framework to identify how stock durations affect the outcomes of interest. However, we suspect the IV to be problematic, and provide a discussion later in the Introduction and in other sections.

Assuming the identification is correct, CPS observes several effects. First, they find temporary R&D (to asset ratio first difference) cuts, earning (to asset ratio first difference) increases and valuation (MB ratio levels) increases, as well as subsequent reversions to normal, after the inflow of short-term investors upon Russell 2000 entries. This is the main result of the paper. Second, they check in subsamples the effect of analyst coverage and disagreement to the regression results, addressing the assumptions of BSX. Third, they conducted robustness on ways of dealing with Russell index inclusion and on alternative measures of investment horizon, other than duration. In this report we mainly focus on the main results, i.e. the regression of R&D, earnings and valuation related outcomes on stock duration instrumented by Russell 2000 entries from "below", reported in CPS Tables 2 to 5.

We try our best to obtain the data needed for replication. We request and obtain the Russell 1000/2000 membership lists from 1980 to date directly from FTSE Russell Company. We also use Thomson Reuters 13F data of institutional holdings as well as CRSP and Compustat data for information about firms and securities; these datasets are available through WRDS. Although we try our best to match the original data, there are details of data selection and processing in the paper that are too unclear for us to match perfectly. This discrepancy may explain some differences in the results of CPS' and ours.

We first describe how various variables of interest respond to the shock of a Russell 2000 entry event, replicating largely Figure 2 and 3 of CPS. We are able to largely replicate the event response of the variables of interest upon Russell 2000 index inclusion. Then, employing the same strategy as CPS, we try to replicate Tables 2 to 5 of theirs. In these regressions, we are able to fairly replicate the first stage regression of stock duration on index entries and controls reported in CPS Table 2. For the full two stage regressions, however, the replication is less satisfactory: CPS Table 3 documents the significant effect of instrumented stock duration on R&D/Asset first difference. We fail to capture significance, but we find significant effect of

instrumented stock duration on the levels of R&D/Asset ratios, a result stronger than CPS in supporting their own claims. CPS Table 4 reports the effect on Earnings/Assets first difference; we are able to get coefficient signs largely right but are not able to get much significance. CPS Table 5 reports the effect on M/B, and we do not obtain significance.

Above we assume the identification strategy of CPS is correct; however, we are concerned about the strategy of using Russell 2000 index entry as the IV for endogenous stock duration, at least in two aspects: firstly, the Russell 2000 index entry may not be perfectly exogenous, since a small cap firm on the doorway to Russell 2000 may have the incentive to cut R&D and generate the earnings surprise in order to boost the share price, get into the Russell 2000 index and enjoy the significant inflow of index-tracking demand of its shares; secondly, the stock duration is not a perfect measure of the investment horizon, and in fact by construction may be biased systematically downward in face of an inflow of demand (i.e. upon index entries), and hence it may suffer from measurement error problem which cannot be addressed by the IV choice. We will elaborate on the discussion in Section 3.

The report is structured as follows: Section 2 introduces the main results of CPS and our replications, Section 3 discusses potential identification problems and Section 4 concludes.

2. Replication

2.1. Data

We follow CPS to find data. Since CPS does not provide many details of the data used, while we try to find what CPS clearly instructs, we use our best judgment to determine the details not clearly specified. However, the problem of discrepancy of original data between CPS's and ours is almost inevitable, particularly for accounting data of firms, which enter the regressions mostly as controls and have many unclear details in trimming and cleaning.

Russell Index. Russell Index is a small cap index covering the US equity of market cap ranking 1001th to 3000th, and reconstructs every June. We request Russell Index historical constituent data directly from the FTSE Russell Company.

Stock Duration. The calculation of the duration measure for stock i that is included in the institutional portfolio j at time T-1, for all stocks i = 1 … I and all institutional investors j = 1 … J, is given
by:

$$Duration_{i,j,T-1} = d_{i,j,T-1} = \Sigma_{t=T-W}^{T-1} \left(\frac{(T-t-1)\alpha_{i,j,t}}{H_{i,j} + B_{i,j}} \right) + \frac{(W-1)H_{i,j}}{H_{i,j} + B_{i,j}}$$

where

$B_{i,j}$ = total percentage of shares of stock i bought by institution j between t = T-W and t = T-1; t,T are in quarters.

$H_{i,j}$ = percentage of total shares outstanding of stock i held by institution j at time t = T-W.

$\alpha_{i,j,t}$= percentage of total shares outstanding of stock i bought by institution j between time t-1 and t.

We find institutional holdings data in Thomson Reuters 13F, and security and accounting data from CRSP and Compustat merged dataset, both available on WRDS. If stock i is not included in institutional portfolio j at time T-1, then

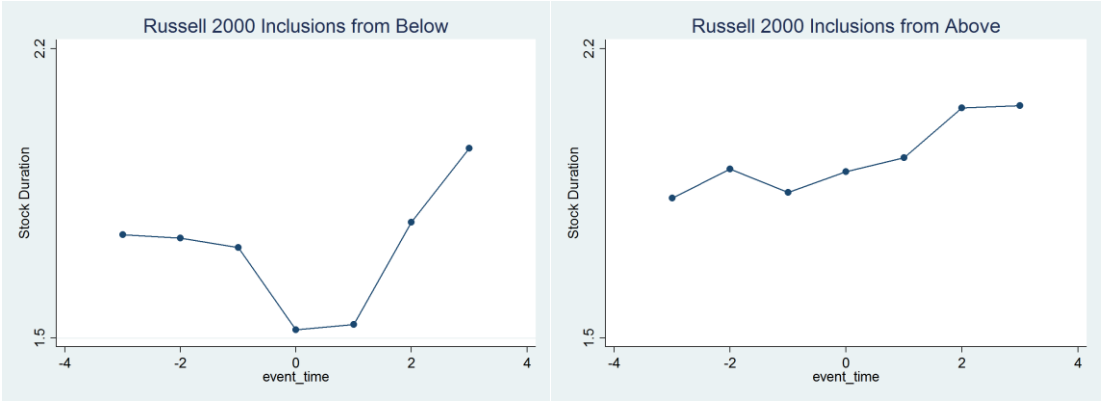
$$Duration_{i,j,T-1} = 0.$$

2.2. Main Results

We report our replication results along with the corresponding results in CPS. First, we report in Figure I, II, III and IV the replication of CPS Figure 2 – Panel A, B and C, as well as Figure 3, which document the event response of respectively stock duration, institutional ownership, share turnover and M/B ratio upon index entries of Russell 2000.

Figure I: Replication of CPS Figure 2, Panel A.: the average response of stock duration (1985-2011) upon events of Russell 2000 index inclusion from below and from above. The first row is our replication, and the second row is from original CPS.

i. Replication



ii. Original Plots of CPS

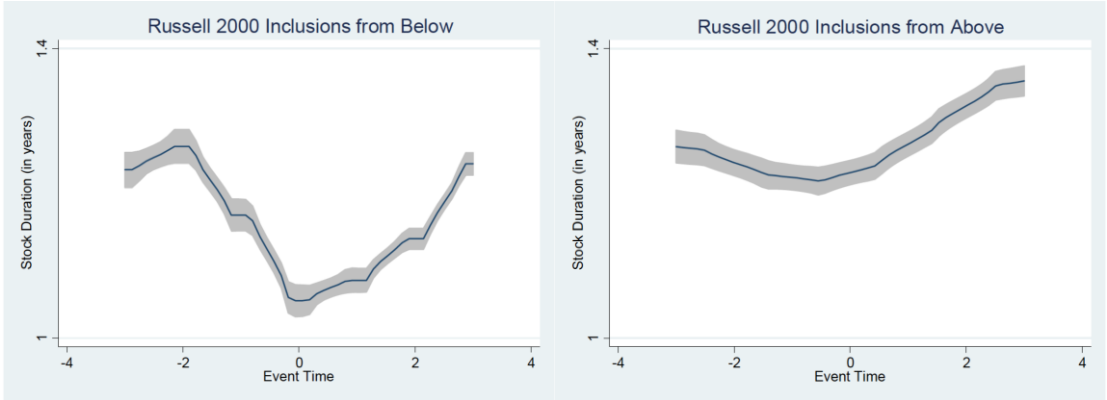
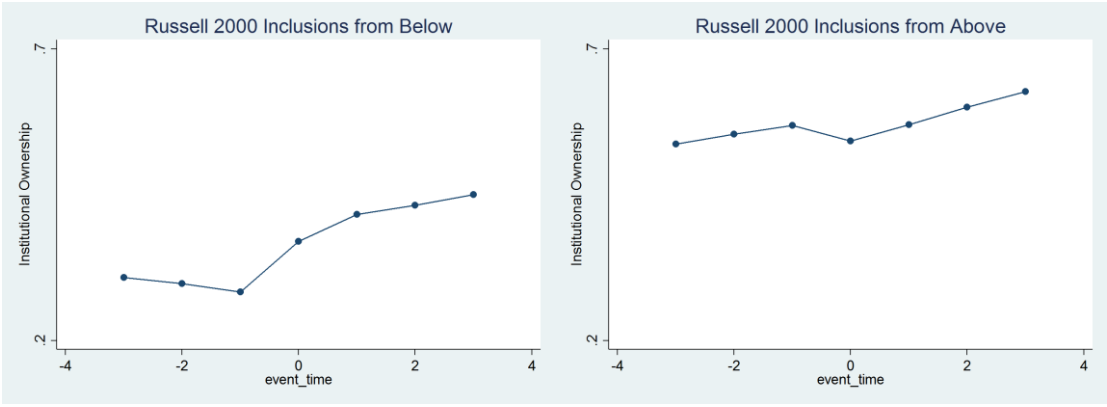


Figure II: Replication of CPS Figure 2, Panel B.: the average response of institutional ownership percentage (1985-2011) upon events of Russell 2000 index inclusion from below and from above. The first row is our replication, and the second row is from original CPS.

i. Replication



ii. Original Plots of CPS

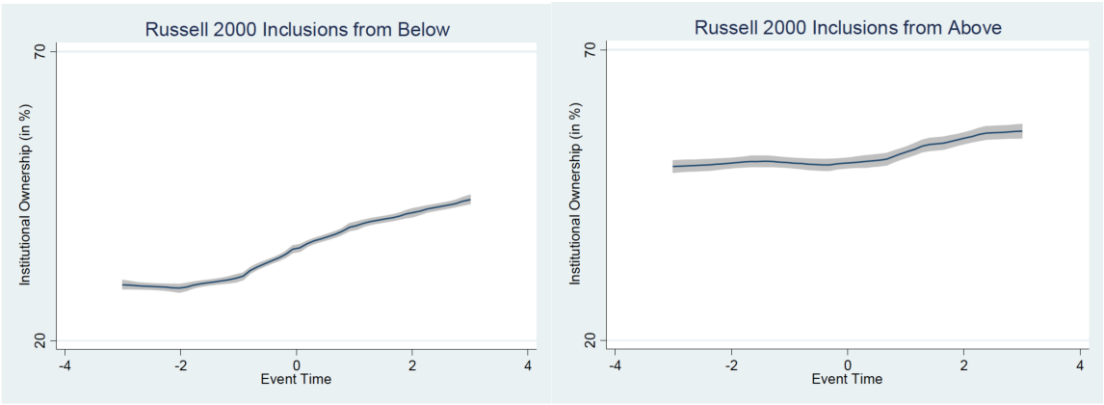
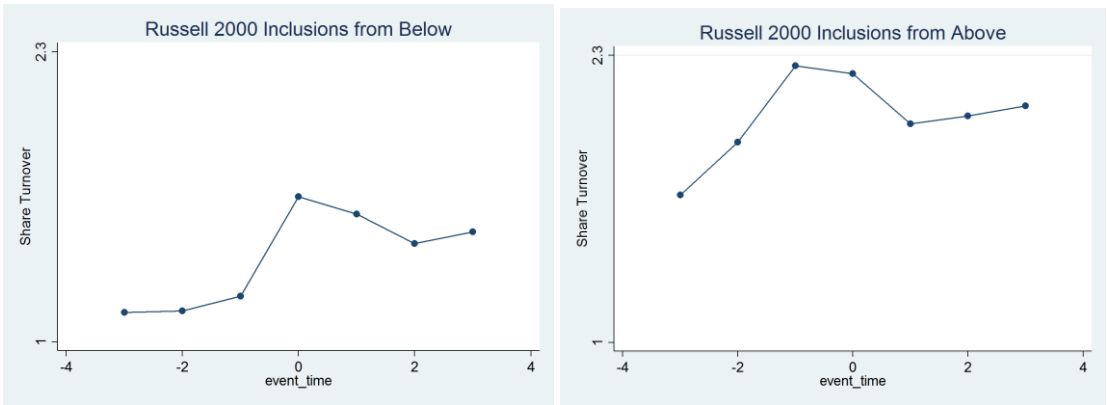


Figure III: Replication of CPS Figure 2, Panel C.: the average response of share turnover (1985-2011) upon events of Russell 2000 index inclusion from below and from above. The first row is our replication, and the second row is from original CPS.

i. Replication



ii. Original Plots of CPS

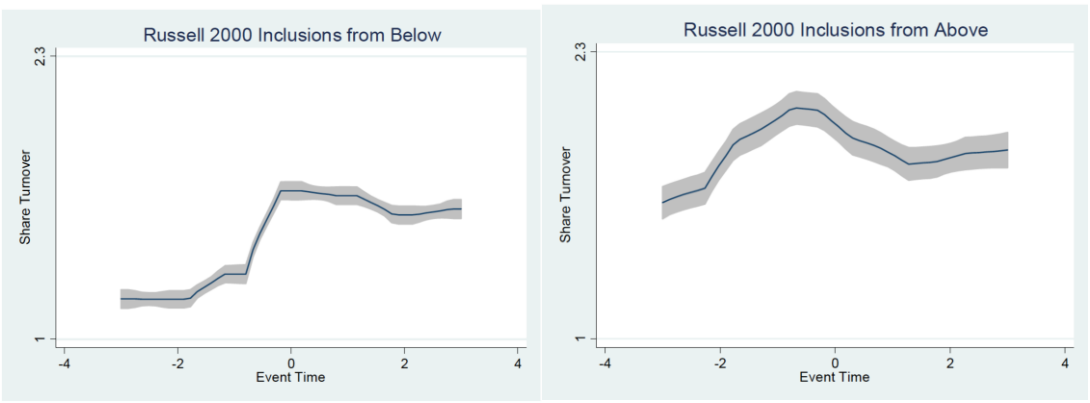
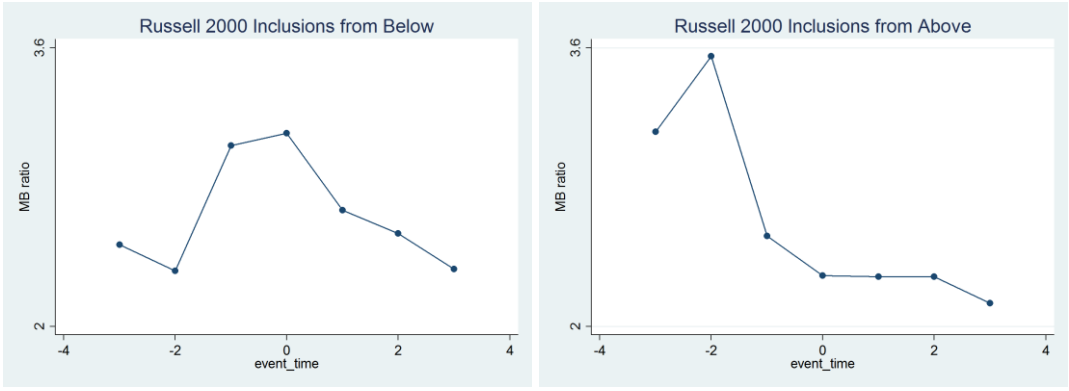
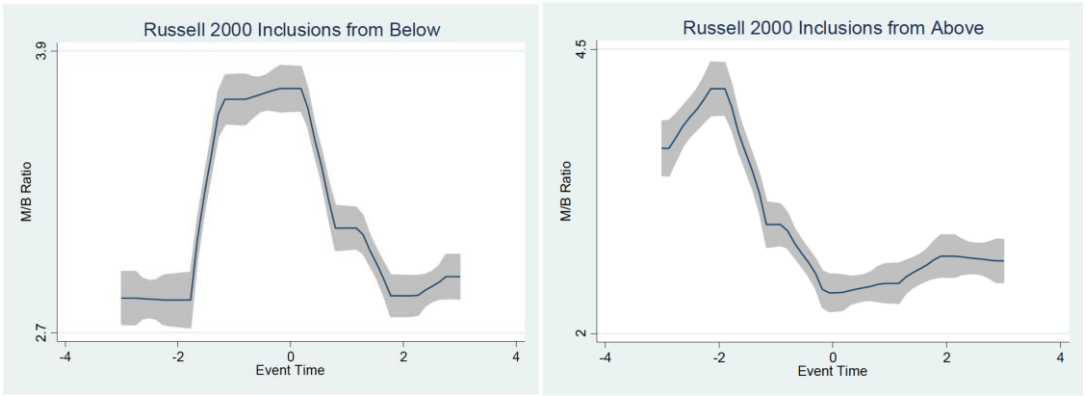


Figure IV: Replication of CPS Figure 3.: the average response of MB ratio (1985-2011) upon events of Russell 2000 index inclusion from below and from above. The first row is our replication, and the second row is from original CPS.

i. Replication



ii. Original Plots of CPS



We can see from these plots that the replication and the original plots resemble each other very well. This shows that our data of these variables, including the particularly important stock duration and MB ratio, along with institutional holdings % (entering regression as control) and share turnover (an alternative measure to short investment horizon) are consistent with the

original data used by CPS, good news for replication. This also verifies these empirical findings documented by CPS.

Next, we provide replication results of Table 3, 4, 5 and 6 of CPS.

Table I: Replication of CPS Table 2.: the first step regression, OLS. The regression result fairly resembles the CPS.

Dependent Variable:	Stock Duration			
	(1)	(2)	(3)	(4)
R2000 Inclusion	-0.373***	-0.235***	-0.278***	-0.176***
	(-16.61)	(-10.55)	(-12.48)	(-7.92)
Market Cap Decile			0.0330***	0.0497***
			(8.39)	(7.26)
Institutional Ownership			0.229***	-0.146**
			(9.64)	(-2.79)
Sales Growth			-0.152***	-0.0773***
			(-13.06)	(-5.96)
PPE/Assets			0.382***	0.541***
			(22.19)	(10.53)
Log(Assets)			0.133***	0.220***
			(9.94)	(5.85)
Leverage			-0.0623**	0.0876
			(-2.81)	(1.96)
Capex/Assets			-1.630***	-0.701***
			(-16.43)	(-5.14)
R&D/Assets			0.361***	0.265*
			(6.32)	(1.97)
Earnings/Assets			0.303***	0.102*
			(11.61)	(2.57)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	Yes	No	Yes
Obs.	34991	34991	34991	34991
Adj. R-sq.	0.0981	0.0752	0.1379	0.1037

The replication of CPS Table 2 is reported in Table I. The replicated sign, magnitude and significance much resemble the original paper. This indicates a good replication.

Table II: Replication of CPS Table 3. First difference in R&D/Assets

Dependent Variable	delta(R&D)/Assets			
	OLS		2SLS	
Model	(1)	(2)	(3)	(4)
Stock Duration (*100)	-0.0183*	-0.0170*	-4.206**	-4.363**
	(-2.26)	(-2.10)	(-3.01)	(-2.89)
Stock Duration[t-1] (*100)		-0.0091		0.641**
		(-0.99)		(2.82)
Market Cap Decile	-0.00203***	-0.00203***	0.00165	0.00146
	(-8.39)	(-8.38)	(1.25)	(1.14)
Institutional Ownership	0.00296**	0.00299**	0.0155**	0.0134**
	(2.76)	(2.78)	(3.05)	(2.95)
Sales Growth	0.0105***	0.0105***	0.00209	0.00316
	(9.1)	(9.08)	(0.65)	(1.1)
PPE/Assets	-0.00621***	-0.00617***	0.00998	0.0078
	(-9.51)	(-9.45)	(1.75)	(1.53)
Log(Assets)	-0.00155	-0.00154	0.00813*	0.00756*
	(-1.84)	(-1.83)	(2.29)	(2.2)
Leverage	-0.0128***	-0.0128***	-0.0170***	-0.0166***
	(-8.09)	(-8.09)	(-5.93)	(-6.14)
R2000 Member[t-1]	-0.000851	-0.000852	0.00224	0.0024
	(-1.39)	(-1.39)	(1.32)	(1.35)
R1000 Member[t-1]	-0.00468***	-0.00466***	0.0129*	0.0114
	(-6.78)	(-6.73)	(2.06)	(1.92)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Obs.	36878	36878	36878	36878

The replication of CPS Table 3 is reported in Table II. The replicated sign for stock duration is significantly negative, which is exactly opposite as CPS. Such discrepancy may attribute to the different choice of data for the same control variable. On the other hand, we try using the level of R&D/Assets as the outcome rather than its first difference, and report in Table III the regression results. It turns out the 2SLS regression coefficient is the right positive sign, though not significant. It may provide some evidence for the story that smaller stock duration, representing short-term investors, might lead to a smaller R&D in levels.

Table III: Modification of CPS Table 3. Levels of R&D/Assets

Dependent Variable	R&D/Assets			
	OLS		2SLS	
Model	(1)	(2)	(3)	(4)
Stock Duration(*100)	-0.0193	-0.0121	3.345	3.496
	(-0.82)	(-0.51)	(1.7)	(1.85)
Stock Duration[t-1](*100)		-0.0497*		-0.572*
		(-2.02)		(-2.02)
Market Cap Decile	-0.0192***	-0.0192***	-0.0222***	-0.0221***
	(-31.16)	(-31.13)	(-11.86)	(-13.46)
Institutional Ownership	0.00365	0.00382	-0.00666	-0.00493
	(1.33)	(1.39)	(-0.95)	(-0.84)
Sales Growth	0.00473	0.00464	0.0116*	0.0107**
	(1.74)	(1.71)	(2.28)	(2.9)
PPE/Assets	-0.0239***	-0.0238***	-0.0367***	-0.0348***
	(-13.25)	(-13.12)	(-4.77)	(-5.52)
Log(Assets)	-0.103***	-0.103***	-0.111***	-0.110***
	(-45.92)	(-45.91)	(-21.32)	(-25.48)
Leverage	0.0446***	0.0445***	0.0477***	0.0473***
	(11.32)	(11.31)	(10.23)	(13.95)
R2000 Member[t-1]	0.00089	0.000883	-0.00173	-0.00186
	(0.57)	(0.56)	(-0.73)	(-0.81)
R1000 Member[t-1]	0.0220***	0.0222***	0.00745	0.00885
	(11.32)	(11.38)	(0.85)	(1.16)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Obs.	37387	37387	37387	37387

In Table IV and Table V we report the replication result for CPS Table 4 and 5. As reported, the regression coefficients for instrumented stock duration and its lagged term are insignificant.

Table IV: Modification of CPS Table 4. First difference of earnings/assets

Dependent Variable	delta(Earnings)/Assets			
	OLS		2SLS	
Model	(1)	(2)	(3)	(4)
Stock Duration	0.00102**	0.000832**	0.0389	0.0396
	(3.23)	(2.66)	(1.44)	(1.43)
Stock Duration[t-1]		0.00130***		-0.00436
		(4.01)		(-1.07)
Market Cap Decile	-0.0125***	-0.0125***	-0.0156***	-0.0155***
	(-15.70)	(-15.75)	(-6.63)	(-6.82)
Institutional Ownership	-0.0009	-0.00135	-0.0129	-0.0114
	(-0.23)	(-0.35)	(-1.33)	(-1.33)
Sales Growth	0.0851***	0.0853***	0.0926***	0.0920***
	(24.23)	(24.29)	(14.16)	(15.17)
PPE/Assets	0.0432***	0.0424***	0.0236	0.0259*
	(13.83)	(13.58)	(1.64)	(2.1)
Log(Assets)	-0.0307***	-0.0308***	-0.0386***	-0.0383***
	(-12.23)	(-12.27)	(-6.02)	(-6.20)
Leverage	-0.0153**	-0.0152**	-0.011	-0.0114
	(-2.85)	(-2.83)	(-1.69)	(-1.80)
Capex/Assets	-0.377***	-0.373***	-0.295***	-0.306***
	(-19.64)	(-19.45)	(-4.79)	(-5.82)
R&D_Assets	-0.149***	-0.149***	-0.145***	-0.146***
	(-10.63)	(-10.61)	(-9.92)	(-10.09)
R2000 Member [t-1]	-0.0259***	-0.0259***	-0.0293***	-0.0293***
	(-12.23)	(-12.24)	(-8.56)	(-8.53)
R1000 Member [t-1]	-0.0232***	-0.0236***	-0.0400**	-0.0387***
	(-9.37)	(-9.51)	(-3.27)	(-3.48)
Year-Fixed Effects	Yes	Yes	Yes	Yes
Obs.	36903	36903	36903	36903

Table V:

	M/B Ratio							
	OLS				2SLS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Stock Duration	0.01	0.01	0.01	0.01	0.74	0.59	0.18	0.20
	(0.78)	(0.70)	(0.68)	(0.98)	(1.78)	(1.28)	(0.46)	(0.52)
Stock Duration [t-1]		0.00342	0.00293	0.00709		-0.0297	-0.00036	0.00476
		(0.42)	(0.35)	(0.83)		(-1.08)	(-0.03)	(0.49)
Stock Duration [t-2]				0.0164				0.0233
				(1.71)				(1.41)
Market Cap Decile	-1.292***	-1.286***	-1.255***	-1.249***	-1.379***	-1.345***	-1.273***	-1.269***
	(-34.81)	(-33.54)	(-29.77)	(-28.72)	(-23.42)	(-27.61)	(-28.69)	(-28.03)
Institutional Ownership	-0.196	-0.138	0.538*	0.531*	-0.687**	-0.346*	0.533**	0.529**
	(-1.31)	(-0.90)	(2.57)	(2.41)	(-2.96)	(-1.97)	(3.26)	(3.18)
Sales Growth	0.333***	0.310***	0.302***	0.298**	0.425***	0.368***	0.313***	0.308***
	(4.39)	(3.78)	(3.33)	(3.12)	(4.64)	(5.84)	(6.06)	(5.85)
PPE/Assets	-0.076	-0.0671	-0.252	-0.313	-0.555	-0.413	-0.369	-0.445
	(-0.60)	(-0.51)	(-1.03)	(-1.26)	(-1.93)	(-1.48)	(-1.24)	(-1.47)
Log(Assets)	-3.849***	-3.809***	-4.531***	-4.585***	-3.922***	-3.927***	-4.593***	-4.660***
	(-27.16)	(-25.95)	(-20.05)	(-19.81)	(-23.34)	(-28.25)	(-25.47)	(-24.46)
Leverage	1.726***	1.842***	1.656***	1.787***	1.767***	1.815***	1.638***	1.769***
	(5.64)	(5.75)	(3.90)	(4.06)	(6.07)	(14.96)	(11.38)	(12.11)
Capex/Asset	0.458	0.473	0.402	0.344	1.747	1.384	0.584	0.559
	(0.74)	(0.76)	(0.58)	(0.49)	(1.79)	(1.63)	(0.91)	(0.83)
R&D/Assets	1.559**	1.844**	1.692	1.573	1.360*	1.613***	1.566**	1.435**
	(2.79)	(3.18)	(1.92)	(1.74)	(2.31)	(4.40)	(3.28)	(2.96)
Earning/Assets	0.261	0.306	0.504	0.636*	-0.0788	0.134	0.481**	0.614***
	(1.13)	(1.23)	(1.66)	(2.01)	(-0.28)	(0.78)	(3.16)	(3.95)
R2000 Member[t-1]	-0.483***	-0.504***	-0.320***	-0.305***	-0.678***	-0.547***	-0.315***	-0.292***
	(-7.42)	(-7.62)	(-4.00)	(-3.73)	(-6.68)	(-8.70)	(-4.69)	(-4.01)
R1000 Member[t-1]	-0.236*	-0.287*	-0.25	-0.268	-0.638*	-0.488*	-0.287*	-0.301*
	(-1.99)	(-2.37)	(-1.65)	(-1.78)	(-2.38)	(-2.50)	(-2.01)	(-2.20)
Year-Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-Fixed Effects	No	No	Yes	Yes	No	No	Yes	Yes
Obs.	38399	36792	36792	34495	38399	36792	36792	34495

2.3 Discussion

We notice that, although the replication of first stage regression is very good, the replication is less unsatisfactory for two stage regressions: either the coefficient for the instrumented stock duration is insignificant, or it is significant with a wrong sign. We try to identify the problem. First, note that we are able to replicate the plots very well. This shows that our replication for stock duration, the endogenous explanatory variable is good. This also shows that, for example, M/B ratio, an outcome variable is replicated well. Meanwhile, we obtain the instrument Russell 2000 entries directly from official FTSE Russell Company, and as a result we strongly believe our instrument to be exactly the same as CPS. Bearing these in mind, the reason why the second regressions are not as good is most likely that the control variables, mostly accounting data series, are not well replicated. This is conceivable, since the trimming of accounting data involves a lot of details that are not clearly specified by the original paper. We list some of such discussions below.

The dataset. We directly use the data from CRSP/Compustat merged – Fundamental Annual from WRDS. However, the CPS merges the data that are obtained separately from CRSP and Compustat manually. The difference in procedure potentially generates different datasets. While the difference may be minimal, this may be one source of discrepancies.

Fiscal year. Some data are only available indexed by fiscal year, while some others may be indexed by calendar year. The processing of such difference may generate discrepancies.

Only USD based stocks are included, and CAD based ones are excluded from our replication.

Active/Inactive business, it may generate difference whether inactive firms are included or excluded. We include those firms.

Financial sector firms. We eliminate firms that are in the financial sector. It is not clear whether CPS does this.

Present at least two years. To eliminate sample bias, we require institutional investors to be preset for two years before being included in the sample.

LIID is a permanent identifier of Compustat firms. Some observations have the same GVKEY and same values for all variables, but have different LIIDs. We drop those redundant observations, which may generate difference.

3. Review of Identification

While the replication above assumes the identification is solid, we do raise some skepticism on the method of causal identification. Specifically, we discuss two major concerns about identification: the potential endogeneity problem of Russell 2000 index entry indicator as IV, and the measurement problem of stock durations as a proxy for investment horizons that fails to be addressed by the IV.

3.1. The Endogeneity Problem of Russell 2000 Entry

CPS argues that, the stock duration is endogenous since it is associated with unobserved firm fundamentals, and the instrument Russell 2000 entries, while correlates with stock duration, does not depend on and thus randomizes fundamentals. We are concerned about this argument of IV exogeneity, since it seems easy to come up with another story of index entry. Russell 2000 index entries bring into firms a surge of demand from index-tracking funds, and for a small cap firm yet to be included into Russell 2000, that demand is very attractive. Thus, in anticipation of such demand surge, the firms may choose to cut R&D expenditure in order to get an earnings surprise, a short-term valuation boost and the opportunity to enter Russell 2000. This may be best framed as an omitted variable problem: unobserved firm management affects both the index entry and the interested outcomes, and thus the index entry and the residuals (which includes unobserved firm management, since it affects outcomes) are not orthogonal. This can also be interpreted from an equivalent (un-) randomized experiment perspective: firms with difference in Russell 2000 entries may have different fundamentals, and thus one cannot directly compare their outcomes.

Several pieces of evidence may be supportive to this argument. First, according to CPS, when stocks enter the Russell 2000 index, they experience a price increase. CPS uses this to support the relevance of index entry as an instrument, but this also supports the view that there is incentive for firms' management to try to get into the index. Second, Russell 2000 constituents are small cap firms, which need the index tracking demand more strongly than larger firms and have more incentives to try to get into the index.

The choice of index entries as instruments is not new. Other index entries have been used as instruments, e.g. S&P 500 entries used as an instrument of institutional ownership by Philippe, Reneen and Zingales (2013). However, We argue that the index inclusion between S&P 500 and Russell 2000 are different. S&P 500 is constructed by selection of a committee, and it is difficult, if even possible, for a firm to apply short-term active management to get into the index. Russell 2000, however, is a purely capitalization based index, and a firm knows when it may possibly get into the index and when short-term active management may work. Therefore, the index entry of Russell 2000 does not enjoy the exogeneity of the index entry of S&P 500.

3.2. The Measurement Problem of Stock Duration

Even if the Russell 2000 index entry were exogenous, we suspect that stock duration, besides its association with unobserved fundamentals, suffers from another endogeneity problem: measurement error, which cannot be addressed by the choice of index entry as IV.

CPS uses stock duration, an invented measure as a proxy for the average investment horizons of investors of a given firm, the immeasurable explanatory variable. Ideally, the smaller the stock duration is for a firm, the more favored it is to short-term investors on average. The duration is calculated as follows: first, for a given quarter, calculate the "individual stock duration" of fund j's investment in stock i, which is essentially an average of up-to-date holding periods, "1, 2, 3, …, 19 (quarters)", weighed by the change of positions over the past 1 to 19 quarters (and for the earliest period considered, i.e. for "19" the weight is the position itself); second, for a given time and stock, average the "individual stock duration" over all funds that invest in that stock, obtaining the final panel of stock duration. This measure is adapted from a slightly

different stock duration measure developed by Cremers and Pareek (2015), who average individual stock duration over different investment targets for a given institutional investor rather than the other way round. The stock duration of Cremers and Pareek (2015), as a measure for the habitual investment horizon of institutional investors, does not have a problem. However, the CPS way of constructing stock duration does potentially cause measurement error problems.

Assume at some time, many funds flow in a firm. It can be that some newcomer funds investing in the firm; it can also be that some old funds increase their investment in the firm. Either way, the stock duration for the current period will mechanically decrease. For the former case, the newcomers have "individual stock duration" being 1 quarter, the smallest duration possible, driving down the average stock duration for the firm. For the latter case, the old funds' "individual stock duration" has weight for 1 (the smallest holding period in that weighed average) increases, driving down the "individual stock duration" and thus also driving down the average stock duration. However, it should be noted that this decrease has nothing to do with whether inflowing investors are short or long term investors. Therefore, there is a systematic error for stock duration to measure investor horizon: the inflow of funds at some quarter may mechanically drive down stock duration for the same quarter.

Will the measurement error be problematic? Consider the time of Russell 2000 index entries, when according to CPS many funds flow into the entering firms. The stock duration measure for that period will be downward biased with regard to true investment horizon. However, the measure (stock duration) also goes down, according to CPS. Noticing this, we discuss two cases. First, the reason why stock duration falls upon index entry may not be because of an inflow of short-term investments, but because of pure mechanical measurement error. If this is the case, the whole story is spurious. Second, even if there is an inflow of short-term investors upon index entry, there is a correlation between the measurement error and the measure itself, which causes the endogeneity of the stock duration measure. This misidentification problem can only be addressed if the instrument variable only correlates with the measure and does not correlate with the measurement error. However, this is not the case, since we have argued that the index entry does correlates to the measurement error. The bottom line is, there may be endogeneity problem resulting from the measurement error of stock duration, and cannot be addressed by the IV which CPS selects.

Conclusion

In this report we replicate and review the CPS paper on whether short-term investors may pressure firms to cut long-term investments to pursue temporary value goals. Specifically, CPS uses Russell 2000 index entry as the instrument and tries to identify how investors' horizon, proxied by stock duration measure, may affect R&D, earnings and valuation. We replicate the index entry event response of stock duration, MB ratio and some other variables of interest, the causal regression results

While dealing with an interesting topic, this paper may have some insufficiencies for further improvement. First, the exogeneity of Russell 2000 entries is not valid enough. Further analysis should work on proving why Russell 2000 entries are independent of firm management decisions. Second, the stock duration measure suffers from a measurement error problem, which at the bottom line may cause endogeneity problem that cannot be addressed by the current IV choice. Further efforts should focus on the improvement of this measure in order to get rid of this potential problem.

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