European Commission

Summer School on Sustainable Finance, 2020

Is there Additionality in Sustainable Investment?

Adair Morse

University of California-Berkeley

Soloman P. Lee Chair in Business Ethics & Associate Professor of Finance

Faculty Director – Sustainable and Impact Finance Initiative

Included in the keynote is joint new work with

Byung Hyun Ahn and Panos Patatoukas

WHAT WOULD BE REQUIRED TO GENERATE NEW REAL INVESTMENT TO SOLVE GLOBAL CHALLENGES?

Need:

- EC number from a few years ago: $180 billion in new capital per year to make progress on climate
- Real investment, not sustainability-rated financial holdings

Agenda:

- Nothing wrong with using the lens of sustainable investing for financial returns and risk management purposes
- But sustainable investment placed with this lens likely do not add to additionality := the flow of new real investment that would otherwise not be invested

GREEN BONDS & ADDITIONALITY

To fix ideas, consider Green/Climate Bonds

<u>Are the projects supported by Green/Climate Bonds additionality?</u>

- Quick answer: “Hard to Tell… A Little, Probably”
- More technical answer:

1) Would the projects have been done anyway?

   If “No” = Type A Additionality

2) Even if yes, does the action of undertaking the Green Bond project lower cost of future sustainable real investment , unrelated to the Bond project itself?

   If “Yes” = Type B Additionality

GREEN BONDS & ADDITIONALITY

To fix ideas, consider Greer

Are the projects supported by G

- Quick answer: "Hard to Tell… A

- More technical answer:

1) Would the projects ha

If "No" = ype A A

2) Even if yes, does the action of undertaking the Green Bond project lower cost of future sustainable real investment, unrelated to the Bond project itself?

If "Yes" = Type B Additionality

Is this really additionality?

- The market is updating on management or firm competitive positioning.
- But, as long as there is an updating (unrelated to the pricing-in of the project itself), then the updating changes the cost of capital for a future sustainable project.
- This argument for additionality only exists while there is the possibility of updating sustainability competitive positioning.

GREEN/CLIMATE BOND EVIDENCE

1. Cost of Capital is Lower
   - "The Green Advantage: A Propensity-score Matching Analysis of Green Bonds' Pricing" (Gianfrate, 2018)
   - "Financing the Response to Climate Change: The Pricing and Ownership of U.S. Green Bonds" (Baker, Bergstresser, Serafeim, and Wurgler (2018)

2. Investors are willing to give up a few (2 to 4) basis points for impact, consistent with a slightly lower cost of capital
   - "The effect of pro-environmental preferences on bond prices: Evidence from green bonds" (Zerbib, 2019)
   - "Financing the Response to Climate Change: The Pricing and Ownership of U.S. Green Bonds" (Baker-Bergstresser-Serafeim Wurgler (2018)

3. Stock prices respond positively to green bond issuance. Thus, equity cost of capital declines.
   - "Corporate Green Bonds" (Flammer, 2018)
   - "Do Shareholders Benefit from Green Bonds?" (Tang and Zhang, 2018)
   - Also the survey by Flammer: "Green Bonds: Effectiveness and Implications for Public Policy"

This all does not "prove" any additionality in projects (type A), but it does suggest some cost of capital additionality benefits (type B)

ESG Investing

- Excluding the Green Corporate Bonds, what about the ~$30 trillion in ESG investing in public equities & bonds?
- Is there evidence of Type A or Type B Additionality

ADDITIONALITY CONCEPTS & EVIDENCE

Type A Additionality: Adding **NEW REAL INVESTMENT** that would not otherwise flow to a project except that it have environmental or social benefits

Evidence (many new working papers, please send to me):

1. Engagement
   - Yes: Evidence that engagement is successful at additionality for managers who were not value maximizing into sustainable investments (e.g. because of entrenchment or short termism)
2. Disclosure effects on cleaning up operations
   - Some: Disclosure can creates additionality because "messy" truth depresses demand. If setting had remained quiet, the clean-up would not have been value-maximizing.
3. Shaming through negative screening
   - Same mechanism through demand when a large asset manager /pension posts exclusions. Again, the clean-up is not value maximizing except through the demand shock.

MISSING

- But the prior page is probably small in ~$35 trillion sustainable investment
- Most capital in ESG looks for financial returns based on ESG propositions, and except for the engagement, there is scant evidence that ES portfolios are creating new real investment
    - New papers starting to tackle on a sector-by-sector basis
    - Note: I am not negative at all on this, we just don't have evidence that we are solving global challenges generally

ADDITIONALITY CONCEPTS & EVIDENCE

Type B Additionality: Firms making ES real investment are rewarded with lower cost of debt or equity capital for future projects, not because of the value-maximizing activity of making the sustainability investment

i.e.: Additionality is ruling out that the firm is just making the value-maximizing activity, but focuses on whether the increased interest in these firms makes them more competitive vis-à-vis less sustainably-minded firms

Tang and Zhang (2018): Abstract

"After compiling a comprehensive international green bond dataset, we document that stock prices positively respond to green bond issuance. However, we do not find a significant premium for green bonds, suggesting that the positive stock returns are not driven by the lower cost of debt."

STARTING POINT
to look for Additonality in ESG Equity Investment

- Original Wave: ESG research only distinguished between the E and S and G
- Second wave: Importance of Risk Management and negative events/compliance

Examples

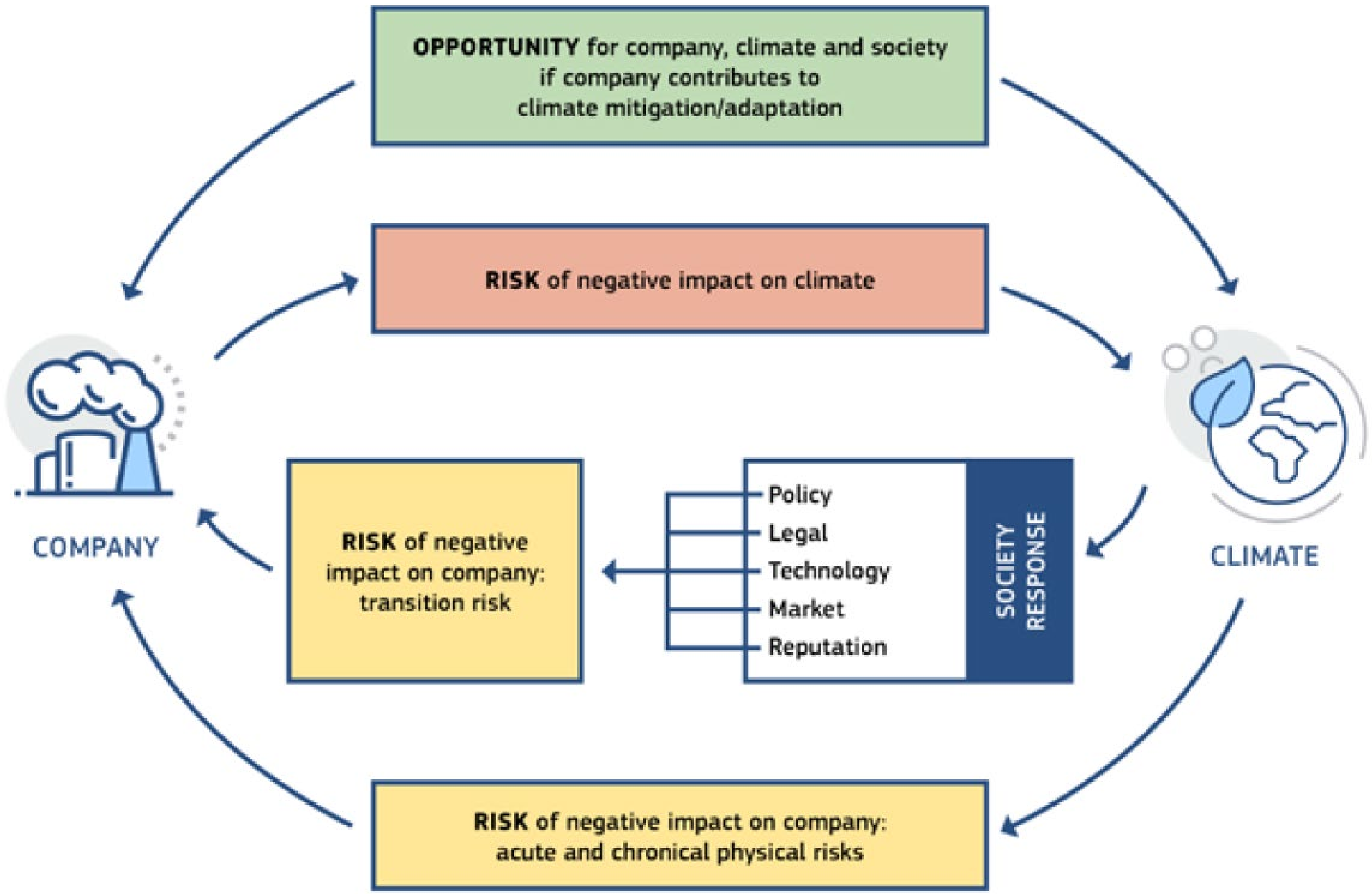
Krüger (2015): Event-study of more than 2,000 sustainability related events

- Finds: Strong negative short term returns when negative sustainability-oriented events. **No reaction to positive events**.

Hoepner-Oikonomou-Sautner-Starks-Zhou (2019) : downside risk particularly important in engagement

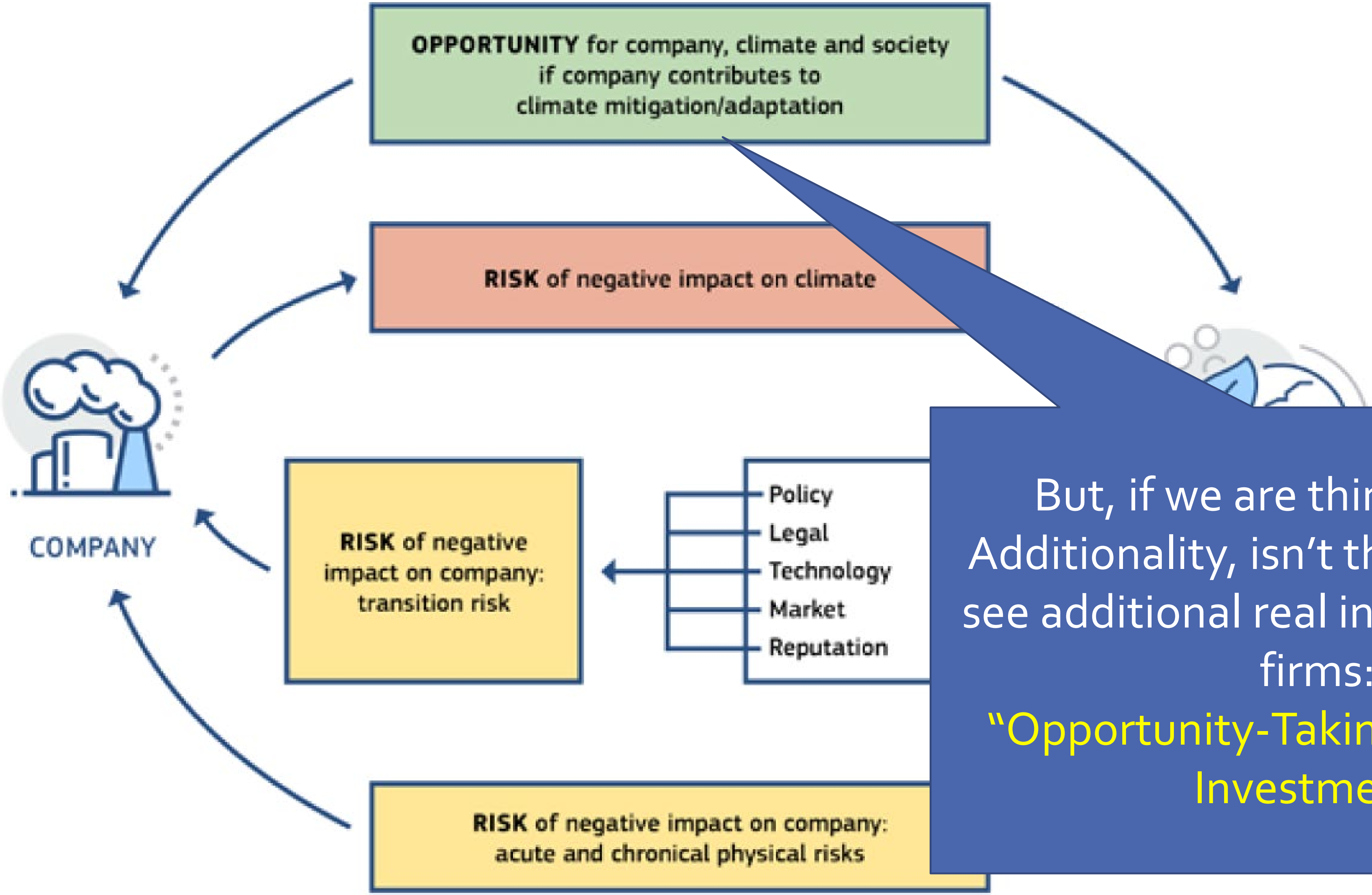
Krüger-Sautner-Starks: "*According to our survey regarding climate-risk perceptions, institutional investors believe these risks have financial implications for their portfolio firms…*"

Many other (apologies to authors here)



Starting Point II: All of these blocks imply a valuation impact, and thus could be financial-return relevant

Source: *European Commission*



But, if we are thinking about Additionality, isn't this a key box to see additional real investment from firms:

"Opportunity-Taking Sustainable Investment"

OPPORTUNITY-TAKING CATEGORIES IN ES SCORES:
We made 3 categories of Opportunity-Taking

Note: Used MSCI-KLD because we need a long time series

Opportunity Type	Examples
Opportunity-taking in Sustainable **Physical Capital** Investment	Investment in Greater Access to Healthcare or Finance, Opportunities in Green Building, Opportunities in Renewable Energy
Opportunity-taking in Sustainable **Human Capital** Investment	Positive Investment in Health and Safety, Employee Involvement, Cash Profit Sharing, Gender and Board Diversity
Opportunity-taking in **Climate Transition** Investment	Opportunities in Climate Change through Energy Efficiency, Product Carbon Footprint, Vulnerability

EMPIRICAL STEPS
to link Opportunity-Taking Investment to Additionality

1. **Assign** ES scores into opportunity categories (prior slide)

EMPIRICAL STEPS
to link Opportunity-Taking Investment to Additionality

1. **Assign** ES scores into opportunity categories (prior slide)
2. **Estimate:** If an opportunity score has changed over the prior year for a firm, does this opportunity score reflect any change in real investment in the firm

   Note 1: Scores get revised ~February each year. We compare changes to prior year changes in investment on income statement & balance sheet

EMPIRICAL STEPS
to link Opportunity-Taking Investment to Additionality

1. Assign ES scores into opportunity categories (prior slide)
2. Estimate: If an opportunity score has changed over the prior year for a firm, does this opportunity score reflect any change in real investment in the firm

   Note 1: Scores get revised ~February each year. We compare changes to prior year changes in investment on income statement & balance sheet

   Note 2: We focus on 3 investment measures following accounting literature

i. Change in human capital investment Δlog SG&A

   Control for R&D and Advertising subcategories of SG&A to make sure we are isolating human capital

ii. Change in tangible capital investment Δlog Net Capx

iii. Change in intangible capital intensity Δ intangible assets / assets

EMPIRICAL STEPS
to link Opportunity-Taking Investment to Additionality

1. **Assign** ES scores into opportunity categories (prior slide)
2. **Estimate:** If an opportunity score has changed over the prior year for a firm, does this opportunity score reflect any change in real investment in the firm
3. **Look** for evidence of return impact to speak to additionality types A and B

.... come back to this design momentarily

ESTIMATIONS: Evidence of opportunity investment

Notation:

HumCapInv : Human Capital Investment
TangCapInv: TangibleCapital Investment
IntanCapInv: IntangibleCapital Intensity

Δ ESPhysCapOppInv: Change in Physical Capital Sustainable Opportunity Investment

Δ ESHumCapOppInv: Change in Human Capital Sustainable Opportunity Investment

Δ ESClimateOppInv: Chan
Transition Investment

$\Delta ES\,OppInv$ *(one of the 3)*

$$= \Delta HumCapInv$$
$$+ \Delta TangCapInv$$
$$+ \Delta IntanCapInv$$

Controls:

$+\Delta$ *firm operating profitability*
$+\Delta$ *firm growth (sales)*
$+baseline\ ESG\ score\ (Krueger)$
$+year$

In words: Asking: If we see a score change in one of the sustainable opportunity investment categories, is the firm doing some real investment that could be generating this score change?

Sustainable Opportunity: Physical Capital

Changes:	Δ Net Score	Dummy Improvement
Model:	Ordered Logit	Fixed Effects Logit
Growth	0.396	-0.186
	[0.491]	[0.630]
Change in Operating Profitability	-0.0217	-0.221
	[0.0510]	[0.356]
Δ Ln SGA	0.145	-0.405
	[0.148]	[0.376]
Δ Ln Net Capx	-0.105	-0.164
	[0.0776]	[0.107]
Δ Intangible Assets / Assets	0.955**	2.119**
	[0.477]	[0.826]
Also Included:	Advertising Intensity, R&D Intensity, Lag Score	
Firm Fixed Effects	No	Yes
Year Fixed Effects	Yes	Yes
Observations	39,671	7,236
Pseudo R-squared	0.546	0.352
Groups		539

Firms that see an improvement in their Sustainable Opportunities in Physical Capital are investing more in intangible assets

OPPORTUNITY-TAKING CATEGORIES IN ES SCORES:
We made 3 categories of Opportunity-Taking

Note: Used MSCI-KLD because we need a long time series

Opportunity Type	Examples
Opportunity-taking in Sustainable **Physical Capital** Investment	Investment in Greater Access to Healthcare or Finance, Opportunities in Green Building, Opportunities in Renewable Energy
Opportunity-taking in Sustainable **Human Capital** Investment	Positive Investment in Health and Safety, Employee Involvement, Cash Profit Sharing, Gender and Board Diversity
Opportunity-taking in **Climate Transition** Investment	Opportunities in Climate Change through Energy Efficiency, Product Carbon Footprint, Vulnerability

Sustainable Opportunity: Human Capital

Changes:	Δ Net Score	Dummy Improvement
Model:	Ordered Logit	Fixed Effects Logit
Growth	0.435***	0.125
	[0.144]	[0.375]
Change in Operating Profitability	-0.0476*	-0.119
	[0.0268]	[0.0772]
Δ Ln SGA	0.275***	0.382*
	[0.0776]	[0.208]
Δ Ln Net Capx	0.000199	0.117**
	[0.0220]	[0.0589]
Δ Intangible Assets / Assets	-0.341**	-0.444
	[0.142]	[0.443]
Also Included:	Advertising Intensity, R&D Intensity, Lag Score	
Firm Fixed Effects	No	Yes
Year Fixed Effects	Yes	Yes
Observations	39,671	18,982
Pseudo R-squared	0.269	0.282
Groups		1649

Firms that see an improvement in their Sustainable Opportunities in Human Capital are investing more in human capital and tangible capital

OPPORTUNITY-TAKING CATEGORIES IN ES SCORES:
We made 3 categories of Opportunity-Taking

Note: Used MSCI-KLD because we need a long time series

Opportunity Type	**Examples**
Opportunity-taking in Sustainable **Physical Capital** Investment	Investment in Greater Access to Healthcare or Finance, Opportunities in Green Building, Opportunities in Renewable Energy
Opportunity-taking in Sustainable **Human Capital** Investment	Positive Investment in Health and Safety, Employee Involvement, Cash Profit Sharing, Gender and Board Diversity
Opportunity-taking in **Climate Transition** Investment	Opportunities in Climate Change through Energy Efficiency, Product Carbon Footprint, Vulnerability

Sustainable Opportunity: Climate Transition

Changes:	Δ Net Score	Dummy Improvement
Model:	Ordered Logit	Fixed Effects Logit
Growth	0.803***	0.984*
	[0.227]	[0.557]
Change in Operating Profitability	0.0272	0.0681
	[0.0434]	[0.191]
Δ Ln SGA	0.104	0.0885
	[0.143]	[0.330]
Δ Ln Net Capx	0.0648	0.0174
	[0.0515]	[0.0826]
Δ Intangible Assets / Assets	-0.621*	0.103
	[0.328]	[0.823]
Also Included:	Advertising Intensity, R&D Intensity, Lag Score	
Firm Fixed Effects	No	Yes
Year Fixed Effects	Yes	Yes
Observations	39,671	13,065
Pseudo R-squared	0.518	0.565
Groups		926

Firms that see an improvement in their Sustainable Opportunities in Climate Transition do not show evidence of positive investment.

STEP 2 PUNCHLINES

Increasing ES scores that pick up:	The firm has increased:
Sustainable Opportunities for Physical Capital Investment	Intangible Assets Intensity
Sustainable Opportunities for Physical Capital Investment	Investment in Human Capital & Tangible Capital
Sustainable Opportunities for Physical Capital Investment	Nothing

STEP 2 PUNCHLINES

Truth-telling: I was skeptical that we would find anything. These are stringent estimations, and the ES measures bulky and noisy.

Increasing ES scores that pick up:	The firm has increased:
Sustainable Opportunities for Physical Capital Investment	Intangible Assets Intensity
Sustainable Opportunities for Physical Capital Investment	Investment in Human Capital & Tangible Capital
Sustainable Opportunities for Physical Capital Investment	Nothing

Are any of these investments Additionality?

Testing for Additionality Type A:

Evidence consistent with Additionality Type A would be that the “sustainable investments” created negative returns during the last year

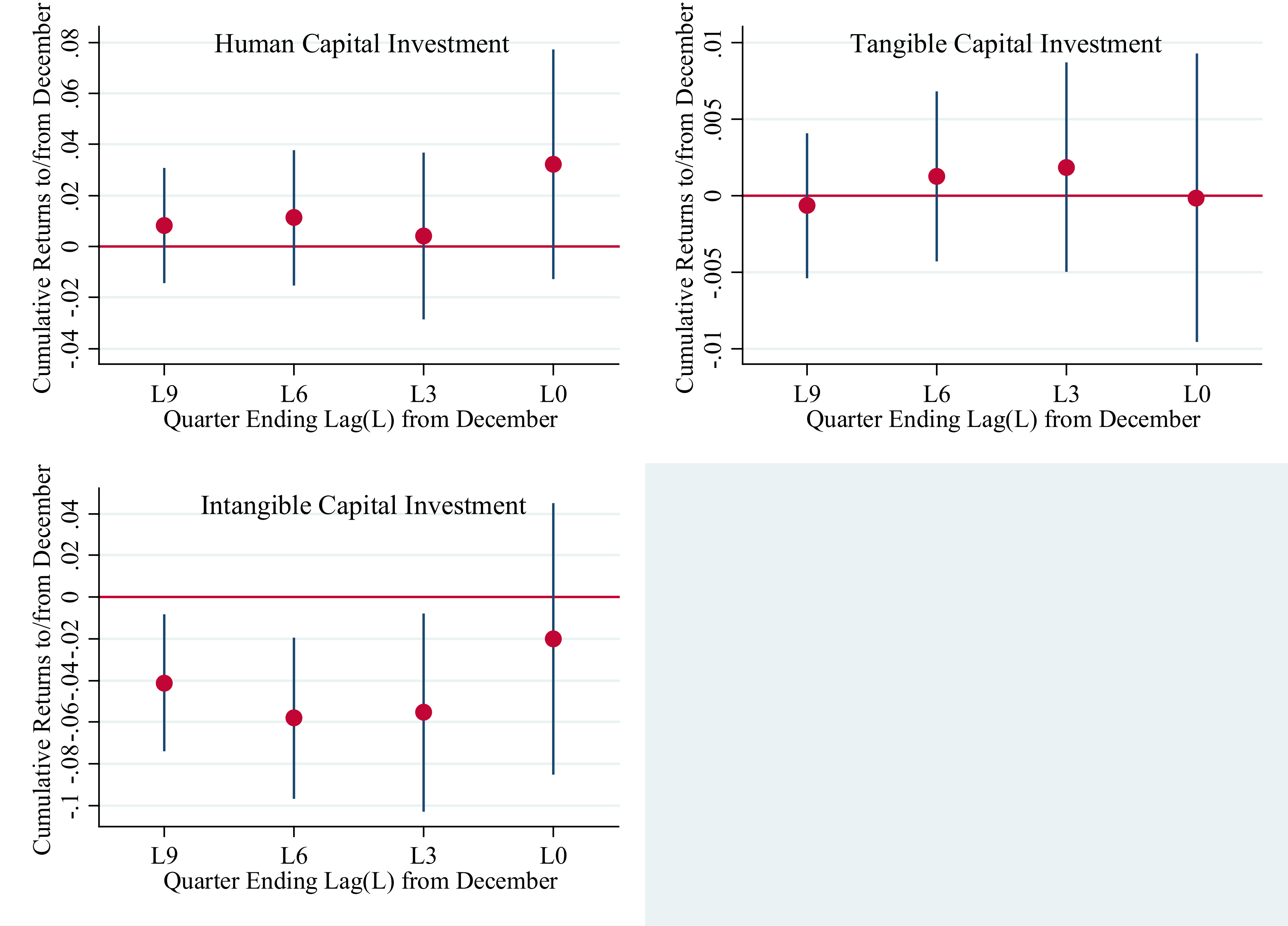
ESTIMATIONS: Concurrent Returns

$$Returns$$
$$= \Delta\ HumCapInv$$
$$+ \Delta\ HumCapInv * \uparrow ESHumCapOppInv$$
$$+ \Delta\ HumCapInv * \uparrow ESPhyCapOppInv$$
$$+ \Delta\ TangCapInv$$
$$+ \Delta\ TangCapInv * \uparrow ESHumCapOppInv$$
$$+ \Delta\ TangCapInv * \uparrow ESPhyCapOppInv$$
$$+ \Delta\ IntanCapInv$$
$$+ \Delta IntanCapInv * \uparrow ESHumCapOppInv$$
$$+ \Delta IntanCapInv * \uparrow ESPhyCapOppInv$$

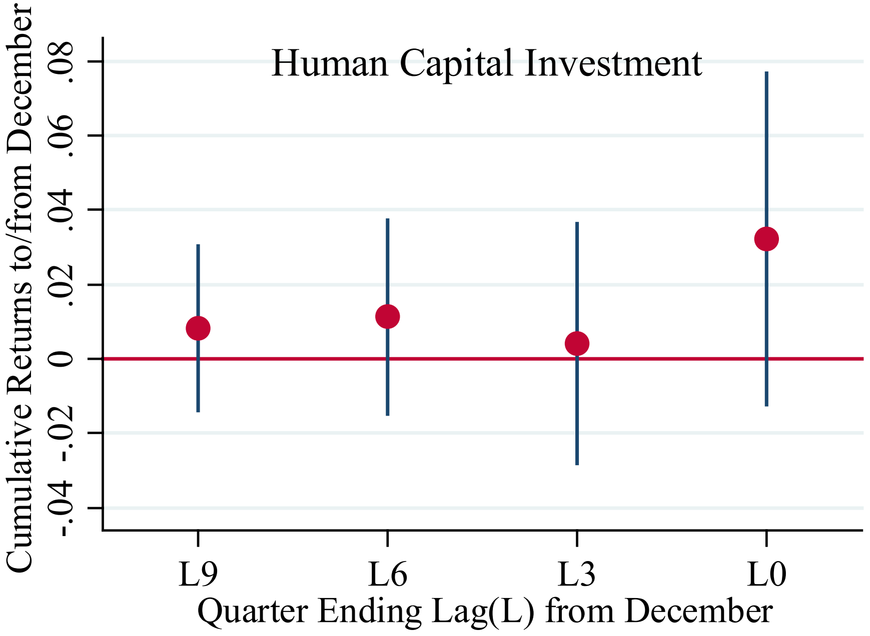
$$+ \text{Year (or FF 5 factors)}$$

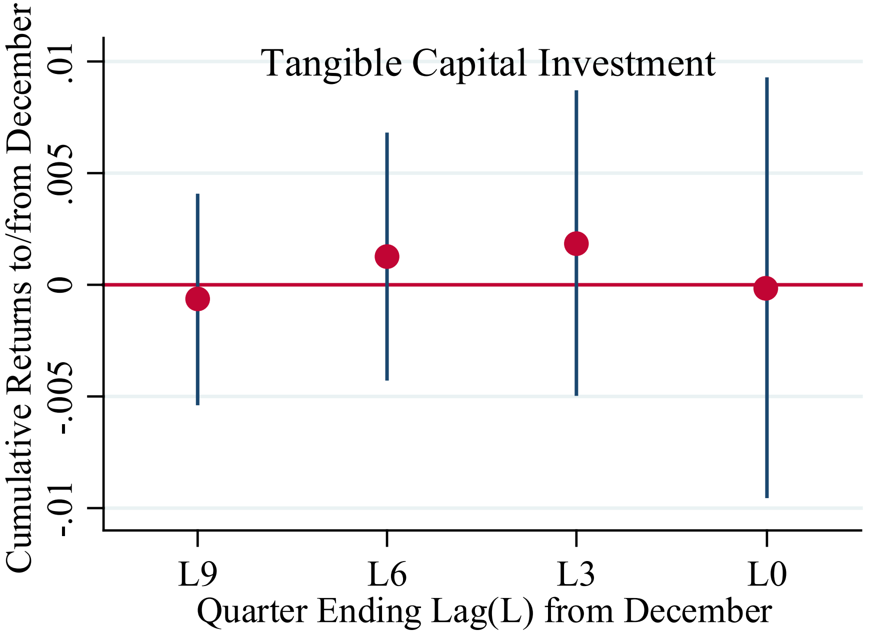
In words....

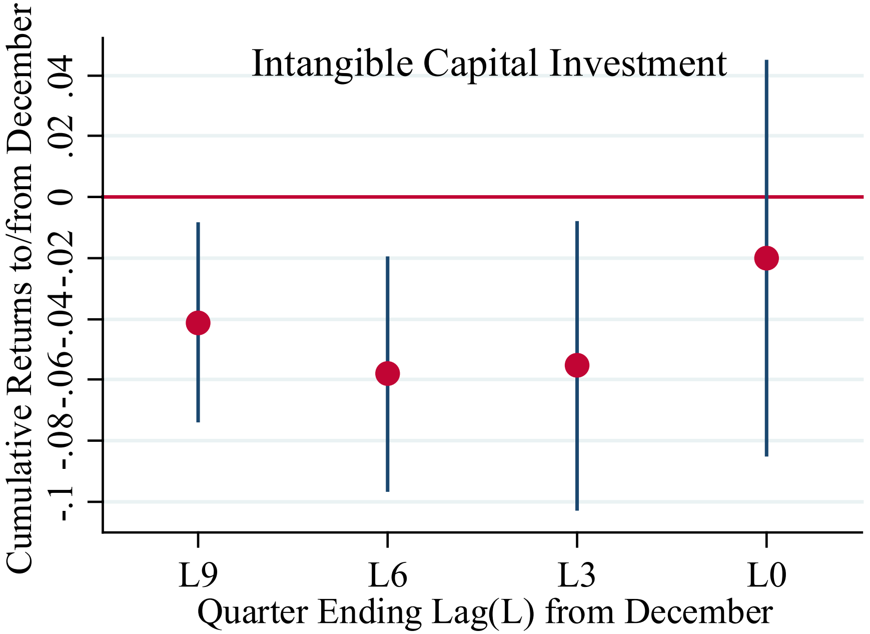
- Looking first backwards from December, are the investments that mark some sustainability opportunity-taking shareholder negative?



Shown here: Coefficient (with confidence bound) of the interaction of each type of investment with the firm having a positive change in Sustainable Opportunity-taking via **Physical Capital** Investments in explaining returns over the lookback year.

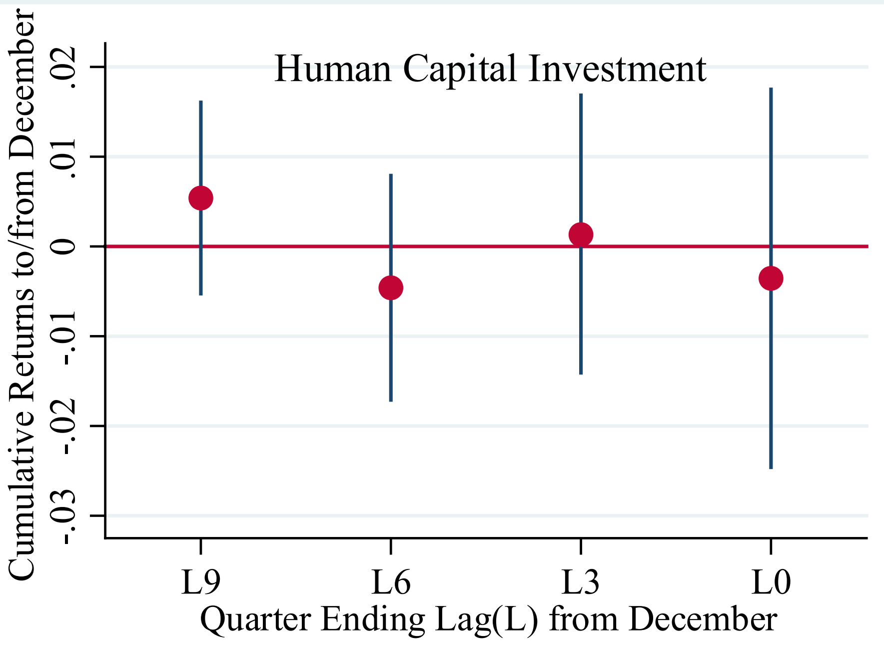


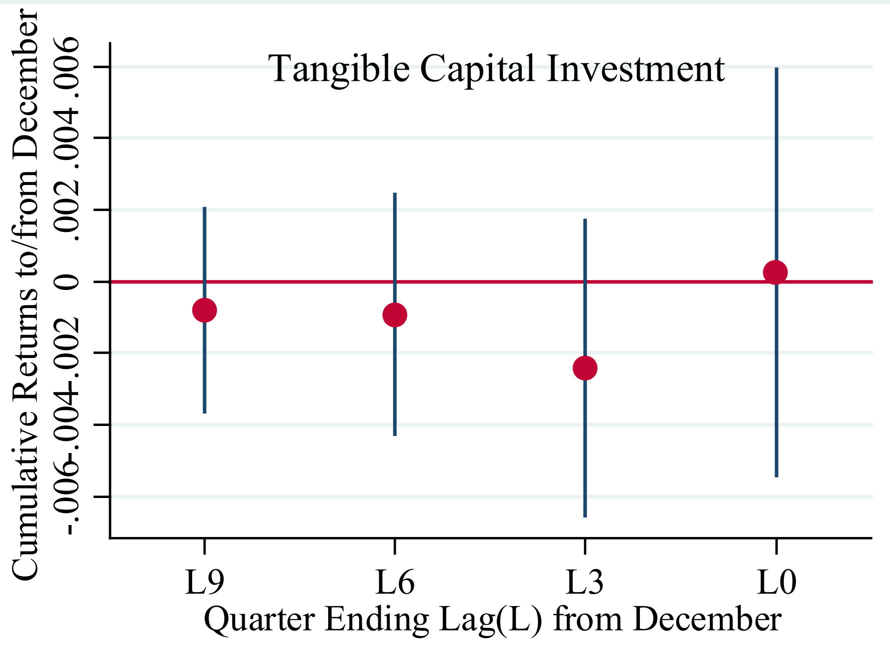


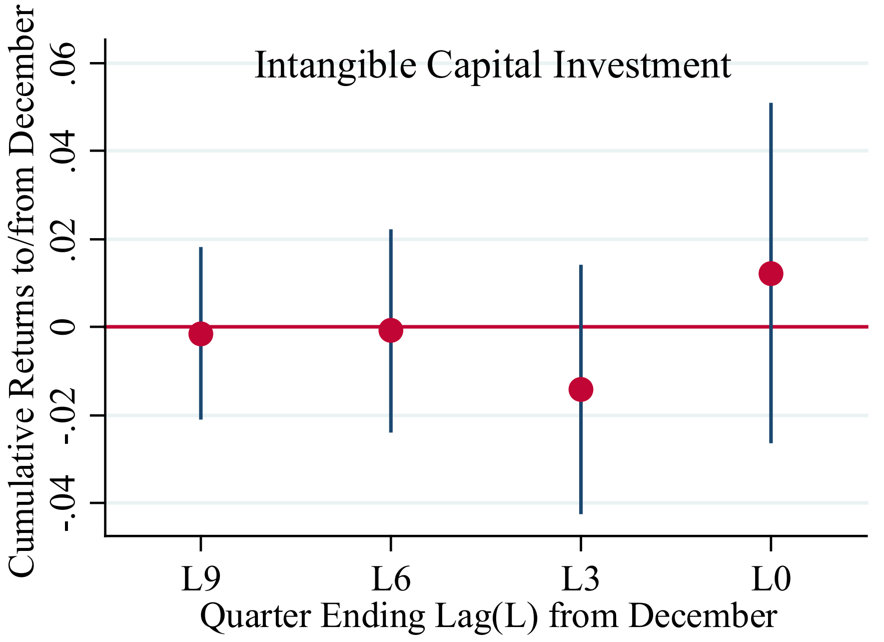


Evidence consistent with Additionality when Intangible Investment is Sustainable Opportunity Taking

Shown here: Coefficient (with confidence bound) of the interaction of each type of investment with the firm having a positive change in Sustainable Opportunity-taking via **Physical Capital** Investments in explaining returns over the lookback year.

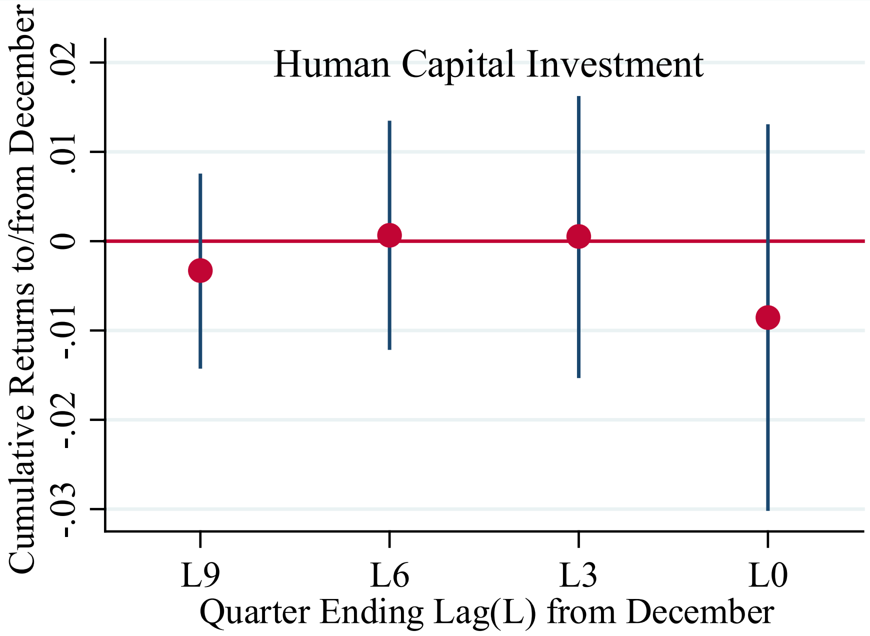


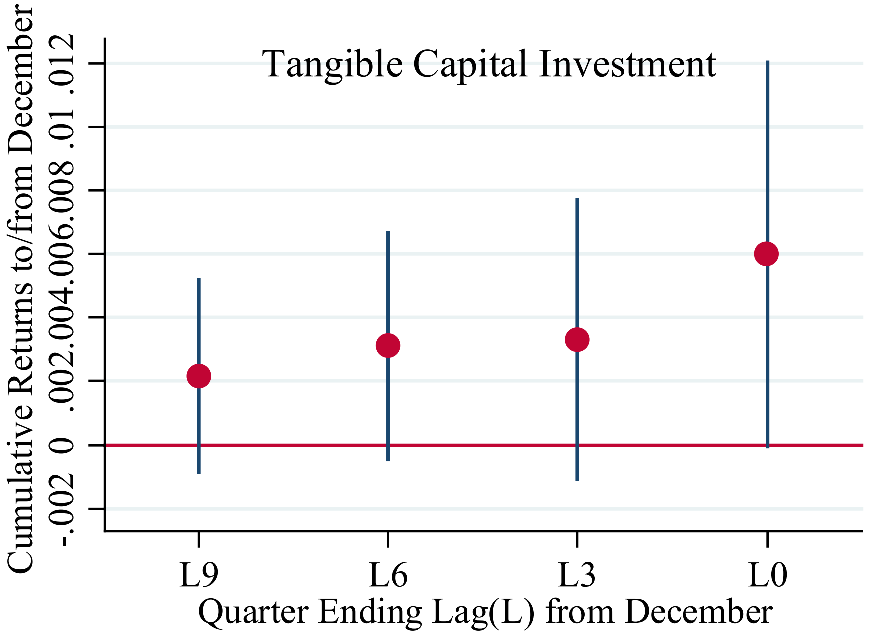


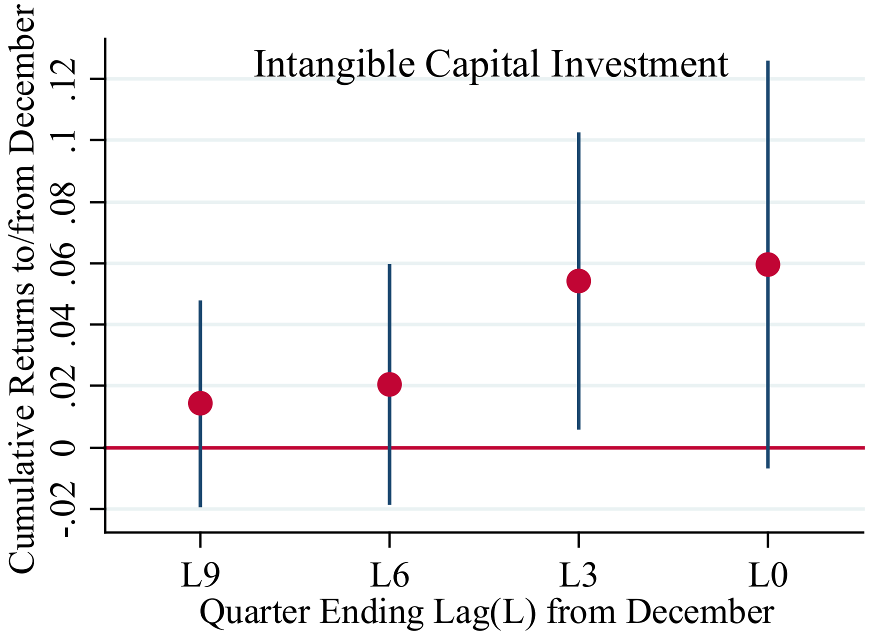


No Evidence

Shown here: Coefficient (with confidence bound) of the interaction of each type of investment with the firm having a positive change in Sustainable Opportunity-taking via **Human Capital** Investments in explaining returns over the lookback year.







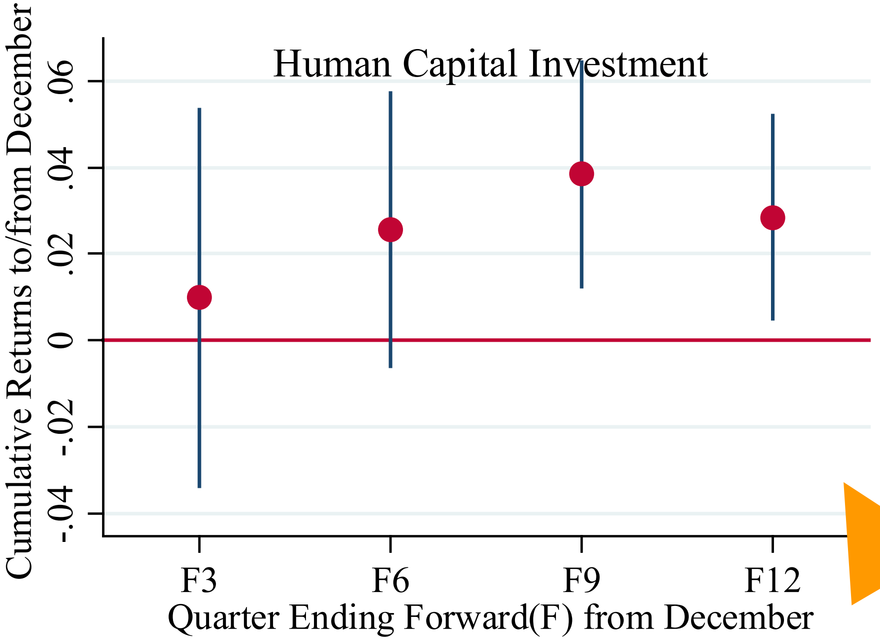
No Evidence

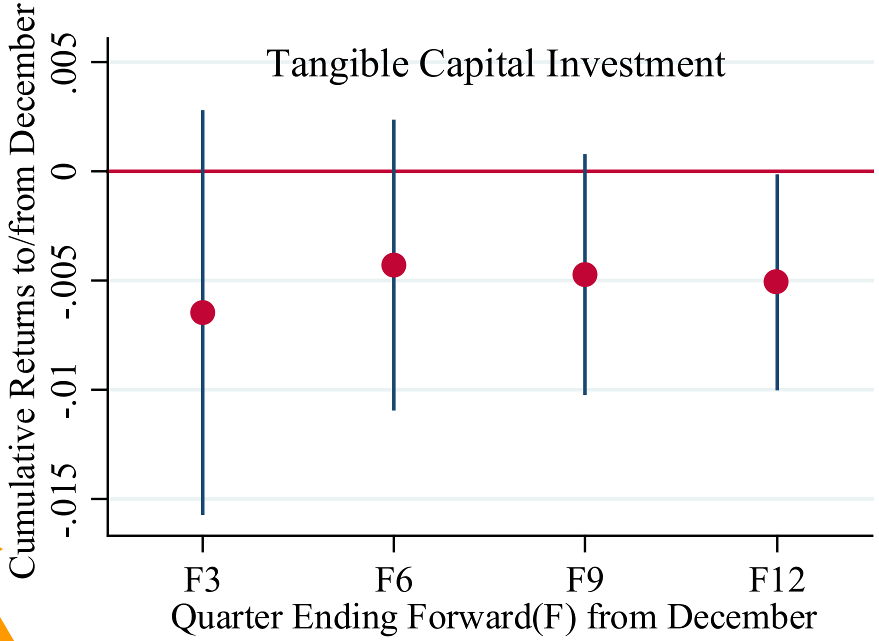
Shown here: Coefficient (with confidence bound) of the interaction of each type of investment with the firm having a positive change in Sustainable Opportunity-taking via **Climate Transition** Investments in explaining returns over the lookback year.

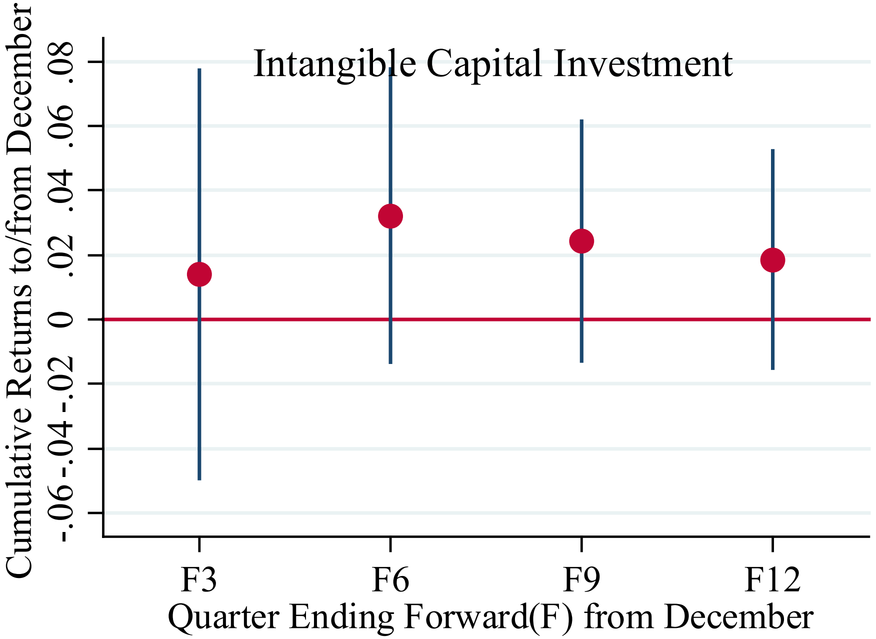
Are any of these investments Additionality?

Testing for Additionality Type B:

- Run the same estimations but looking forward (predictive estimations) asking…
- Are the investments that mark some sustainability opportunity-taking creating a lower cost of equity capital for firms that invested last year
  - This is the Flammer(2018) or Tang-Zhang(2018)-like test of Green Bonds, but in equities
  - Note: other ways to interpret… mispricing

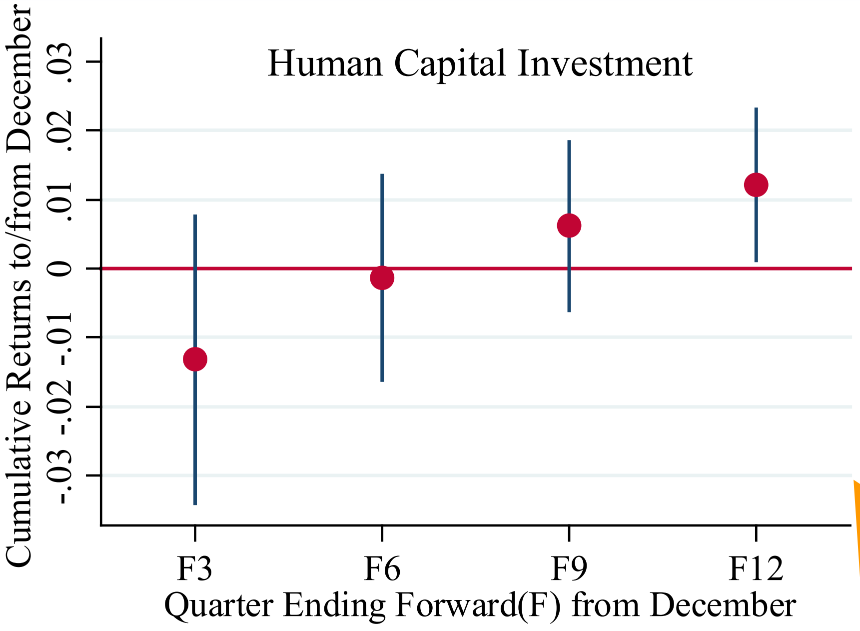


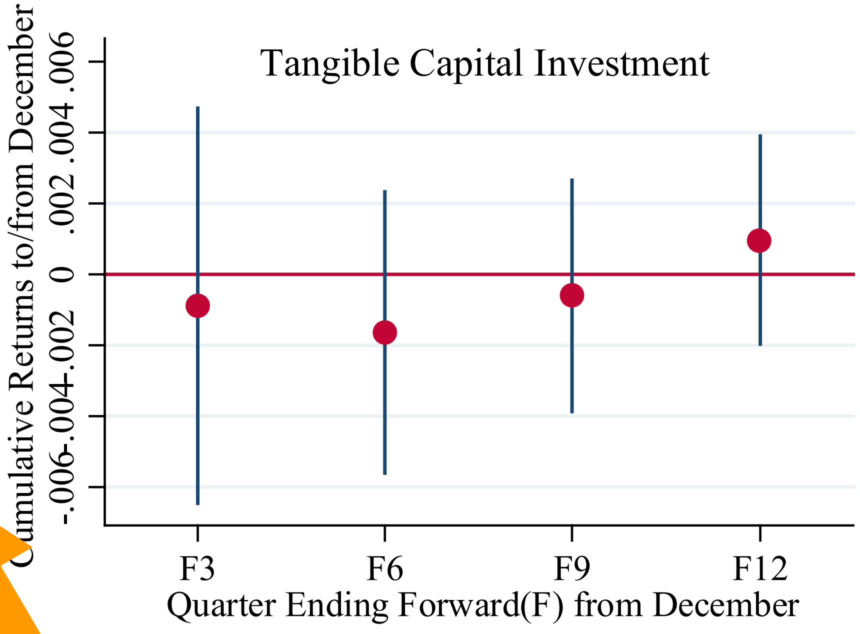


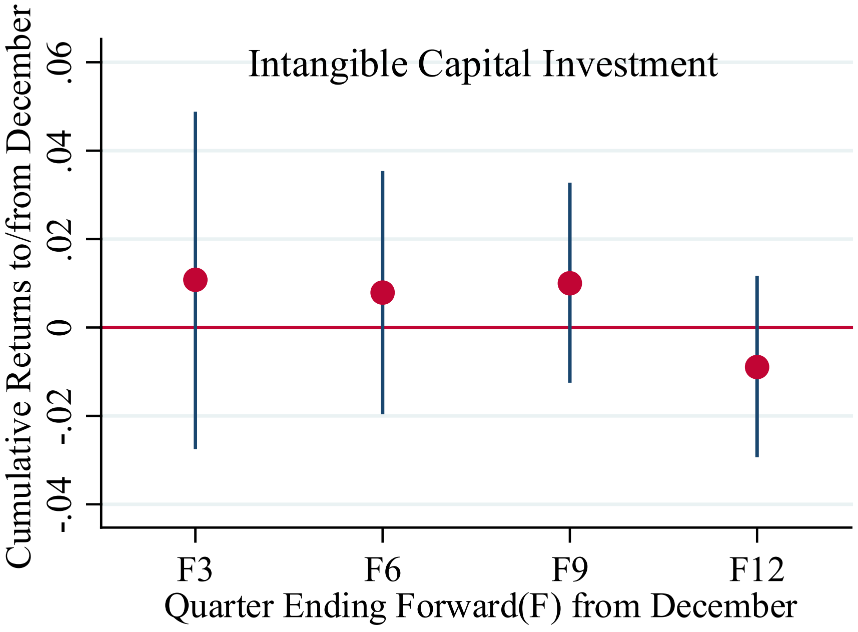


Evidence consistent with Additionality Type B when Human Capital Investment complements Improvements in Sustainable Opportunity-Taking

Shown here: Coefficient (with confidence bound) of the interaction of each type of investment with the firm having a positive change in Sustainable Opportunity-taking via **Physical Capital** Investments in explaining returns over the forward year.

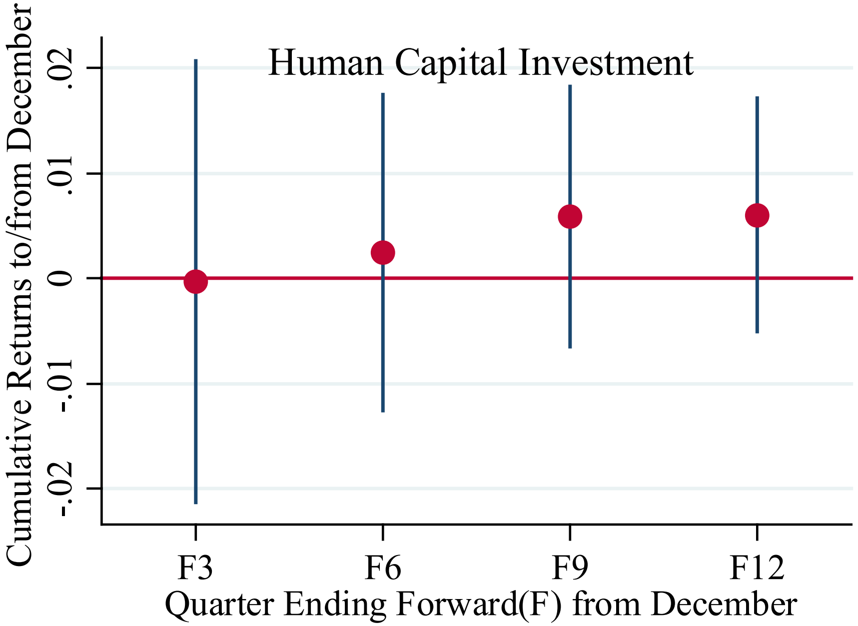


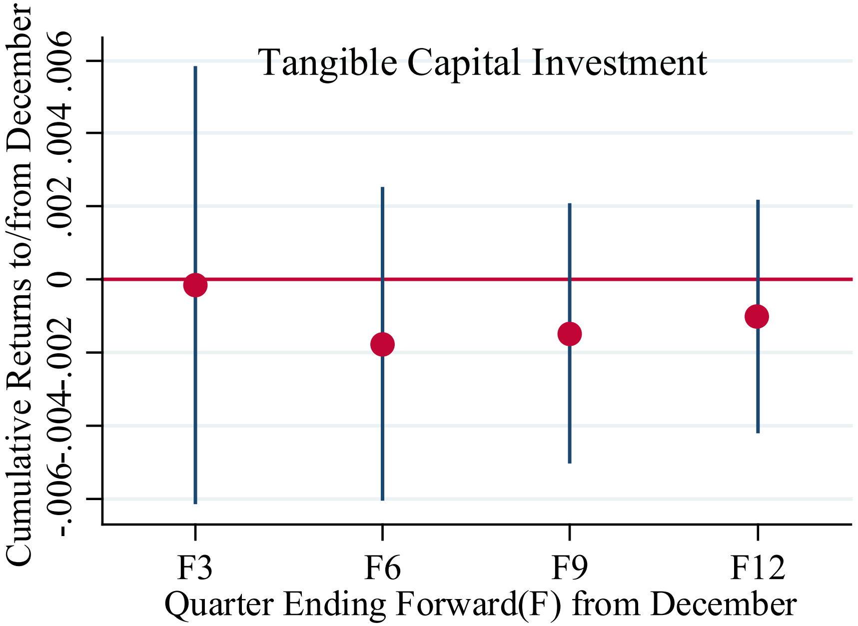


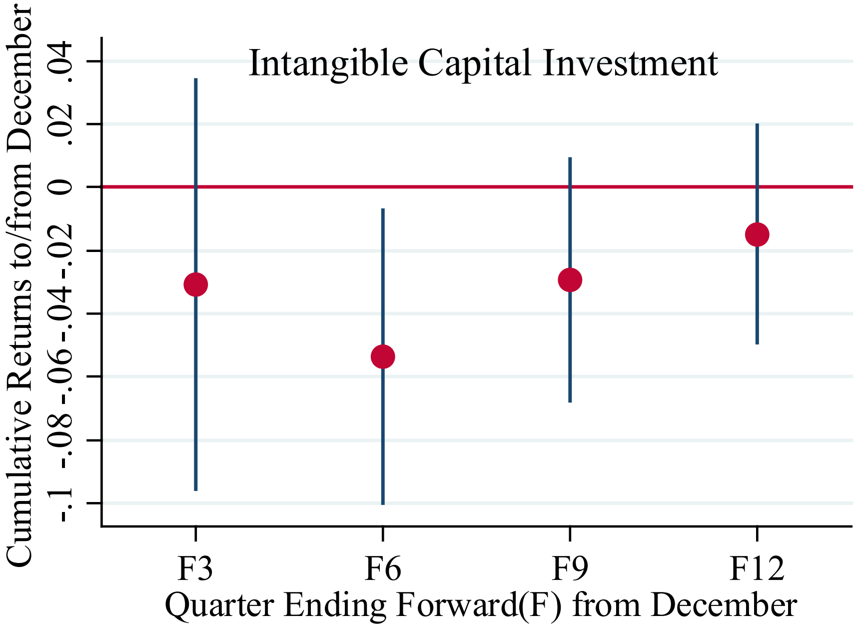


AGAIN Evidence consistent with Additionality Type B when Human Capital Investment complements Improvements in Sustainable Opportunity-Taking

Shown here: Coefficient (with confidence bound) of the interaction of each type of investment with the firm having a positive change in Sustainable Opportunity-taking via **Human Capital** Investments in explaining returns over the forward year.





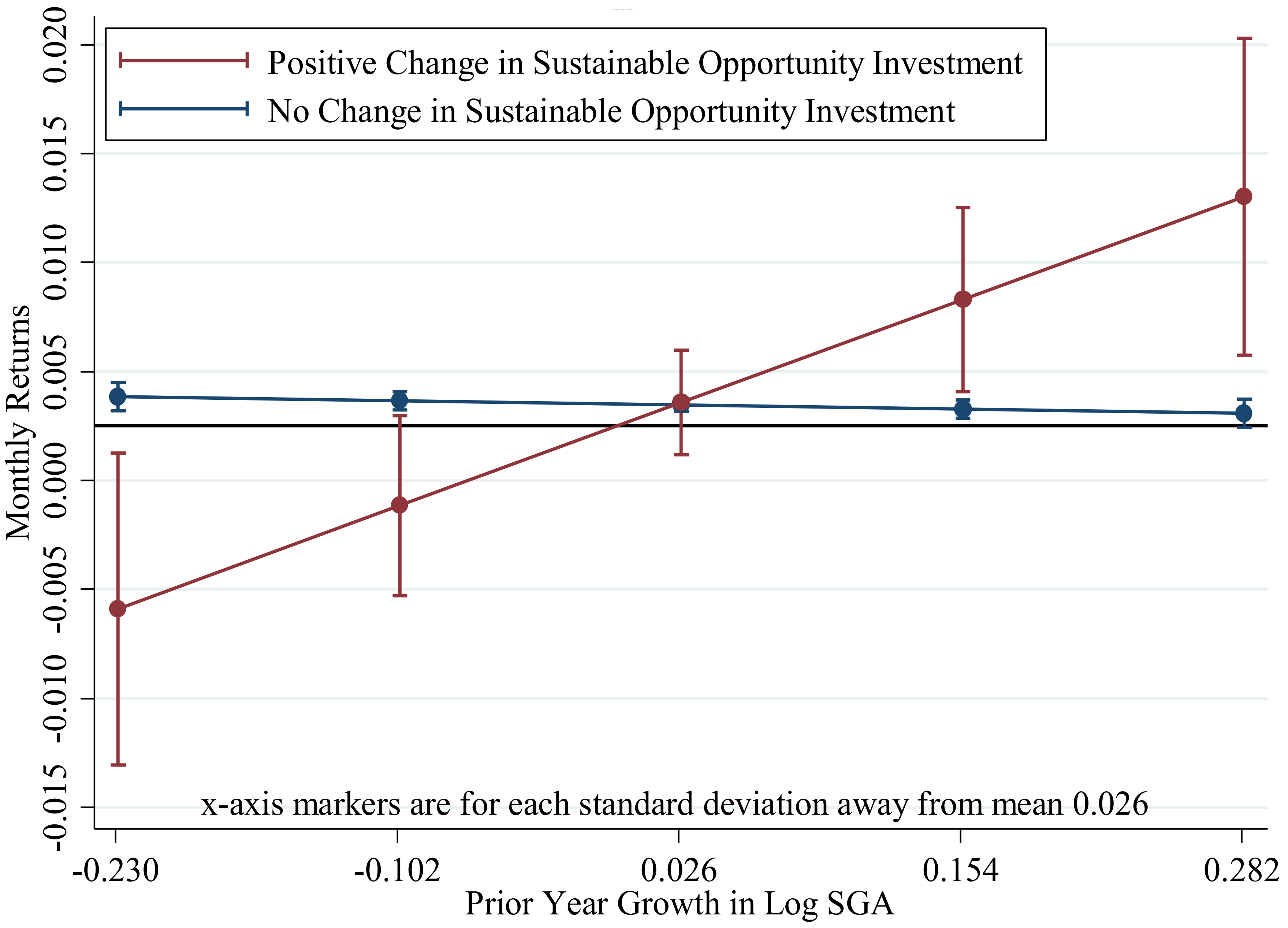


No Evidence Surrounding Climate Investment

Shown here: Coefficient (with confidence bound) of the interaction of each type of investment with the firm having a positive change in Sustainable Opportunity-taking via **Climate Transition** Investments in explaining returns over the forward year.

MARGINAL EFFECTS MAGNITUDE

Estimation: forward annual returns, expressed as monthly return, as a function of FF5 factors + Investment types



WRAPPING UP – BACK TO THE BIG PICTURE

- Many asset managers / pension managers /wealth etc think it is important that their capital "improves climate damage" or "levels labor equity" or…
  - These are statement of additionality, not just financial investment
- Our priors: would not find much additionality in public equity investment
- Early evidence suggests: firms are undertaking some projects creating new real investment toward sustainability / labor goals that would not otherwise happen
  - Associative not causal evidence
  - Firms investing via intangibles toward sustainabily face lower returns
  - Firms undertaking more human capital investment toward sustainability and equity opportunities enjoy lower cost of capital for future endeavors
  - Just the tip of the iceberg: the answers on "where" and "how much" matter

Thank you!

It is always a pleasure and honor to participate with the EC and the people at the front lines of tackling issues.

Adair

adair@berkeley.edu