# Blockchain without Crypto? Linking On-Chain Data Growth to Firm Fundamentals and Stock Returns

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# Blockchains, Cryptocurrencies, & DeFi

- Digitization, P2P networks, & on-demand economy.
- Blockchain as decentralized consensus (e.g., Cong & He, 2019) and DeFi (Harvey, Ramachandran, & Santoro, 2021).

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        - “Tokenomics: Dynamic Adoption and Valuation” (Cong, Li, & Wang, 2021)
        - “Token-based Platform Finance” (Cong, Li, & Wang 2020)
    2. General payment tokens:
        - Bitcoin, Ethereum, CBDCs, DCEP, etc.
        - Stablecoins: OMO vs. collateralization vs. dynamic supply.
        - Interactions with monetary policy.

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        - Corporate coupons; Non-Fungible Tokens.
        - Centralized exchange rate for product/ownership.

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    4. Security tokens:
        - Cash-flow based. Possible separation of governance and cash flows.
        - Howey-test, entrepreneurial effort pre- vs. post-launching the platform.
- Cong, Karolyi, Tang, & Zhao (2021): C-5 Factor Model (MKT,VAL,MOM,NET,SIZE) & Segmentation across categories.

# Tokenomics: Tokens as a Hybrid Asset

- Roles of tokens:
  - Bootstrapping and adoption acceleration.
  - User-base stabilization.
  - Corporate finance toolkit: financing/incentivizing decentralized contribution.
  - Compensating/incentivizing entrepreneurs and innovation.
  - Mitigating agency issues, moral hazard, etc.

- Sources of value:
  1. Means of payment to realize unique trade surplus on the platform.
  2. Scarcity: token burning/buyback policy by insiders and designers.
  3. Backing by reputation or collateral.

- Sources of volatility:
  1. Fundamental technology/productivity/policy shocks.
  2. Speculation and behavioral factors.
  3. Endogenous adoption.
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  2. Speculation and behavioral factors.
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  4. Countercyclical/stabilizing token supply/allocation policy.
- Transition from Platform Tokens to Security Tokens:
  - “Staking, Token Pricing, and Crypto Carry” Cong, He, & Tang (2022).

# Institutional Background

- “You can’t have blockchain without crypto.”—CZ_binance (Changpeng Zhao), Twitter, 2022/2/1.
- Executives’ favorable sentiments (e.g., Pawczuk et al., 2018); anecdotes (Bruce, 2021; Gkritsi, 2021).
- Blockchain without Crypto:
    - Cao et al., (2018,2020); Iyengar et al. (2021).
    - Chen et al. (2021): state blockchain law; customers versus suppliers.
    - Chiu (2021): investment sensitivity to stock prices.
    - Cheng et al. (2019); Cahill et al. (2020): announcements and reactions.
    - Chen, Cheng, & Luo (2021): China ABS.
- Alternative data and nowcasting:
    - Da et al. (2011): Google search volume.
    - Rajgopal et al. (2003): Web traffic.
    - Huang (2018): Customer product rating.
    - Green et al. (2019): Employer rating.
    - Katona et al. (2018) and Zhu (2019): Parking lot occupancy.
    - Agarwal, Qian, & Zhou (2021): Transaction level credit card spending.

# Overview of Main Findings

- "You can't have blockchain without crypto."—CZ_binance, Twitter, 2022/2/1.
- Executives' favorable sentiments (e.g., Pawczuk et al., 2018); anecdotes (Bruce, 2021; Gkritsi, 2021).
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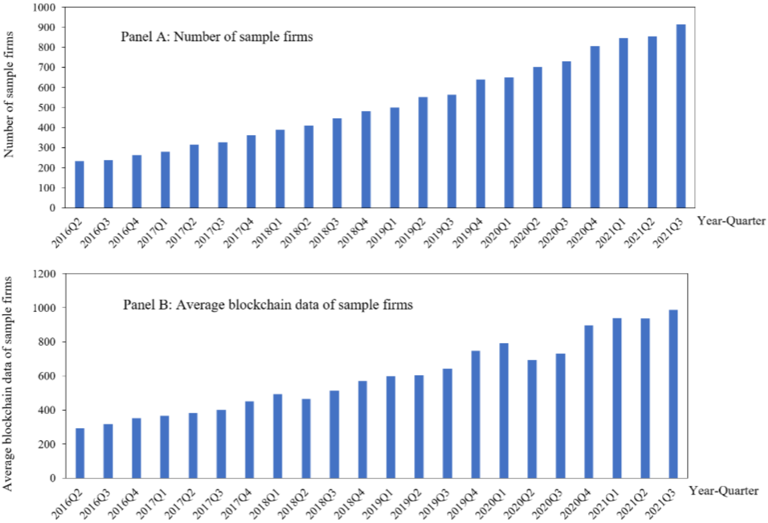
# Outline

- Introduction and Background
- Data and Variables
- Empirical Findings and Discussion
- Conclusion

# Data

- Blockchain service platform; 2015 (22 quarters from 2016Q2 to 2021Q3); 11,497 firm-quarter observations; 600 TB.
- Public firms on Shanghai and Shenzhen stock exchanges; merged with CSMAR using USCC; 1,149 firms, average 523 firms per quarter.
- Permissioned and "public/open" blockchains.
- Updates and total size.
- Banks, supply chains, funds, etc.

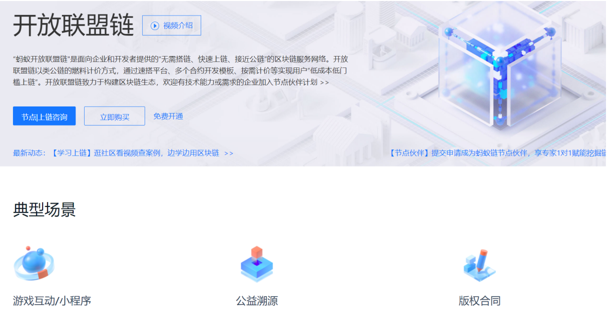
# Trends in On-Chain Data



# Types of On-Chain Data

**Panel D: Category of blockchain data**

| | Mean | SD | P5 | P50 | P95 |
|---|---|---|---|---|---|
| Operation | 0.253 | 0.298 | 0.023 | 0.267 | 0.786 |
| Financials | 0.236 | 0.308 | 0.024 | 0.233 | 0.697 |
| Human resources | 0.100 | 0.111 | 0.010 | 0.096 | 0.285 |
| Marketing | 0.102 | 0.109 | 0.010 | 0.099 | 0.323 |
| IT | 0.091 | 0.110 | 0.011 | 0.097 | 0.279 |
| Supply chain | 0.120 | 0.118 | 0.010 | 0.124 | 0.324 |
| Others | 0.099 | 0.131 | 0.010 | 0.094 | 0.285 |



## 开放联盟链

“蚂蚁开放联盟链”是面向企业和开发者提供的“无需搭链、快速上链、接近公链”的区块链服务网络。开放联盟链以类公链的燃料计价方式，通过速搭平台、多个合约开发模板、按需计价等实现用户“低成本低门槛上链”。开放联盟链致力于构建区块链生态，欢迎有技术能力或需求的企业加入节点伙伴计划 >>

最新动态：【学习上链】逛社区看视频查案例，边学边用区块链 >>

【节点伙伴】提交申请成为蚂蚁链节点伙伴，享专家1对1赋能挖掘

## 典型场景

游戏互动/小程序

公益溯源

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# Key Variables

- On-chain data growth (YOY and quarterly):

$$BDG_{i,q} = \mathrm{Ln}\left(\frac{\#\text{ of BD}_{\mathrm{i,q}}}{\#\text{ of BD}_{\mathrm{i,q-4}}}\right).$$

- ROA, quarterly operating income scaled by lagged assets.
- AG, quarterly growth in total assets.
- SG, quarterly growth in sales.
- PA and PG as innovation outcomes.
- Earnings surprises: SUE, CAR.
- Nowcasters:
  - SEAG, APPG, CUSG, EMPG, CARG, SPEG.

# Empirical Specification

Quarterly panel data regressions of firm fundamentals on BDG and other variables:

$$FF_{i,q+n} = \alpha_{\mathrm{d}} + \beta_1 * \mathrm{BDG}_{\mathrm{i,q+1}} + \beta_2 * \mathrm{FF}_{\mathrm{i,q}} + \gamma_{\mathrm{i,q+n}} + \mathrm{controls}_{\mathrm{i,q}} + \mathrm{e}_{\mathrm{i,q+n}}, \tag{1}$$

where $\mathrm{FF}_{\mathrm{i,q+n}}$ is Firm i's fundamentals in quarter $\mathrm{q+n}$ (n=1 or 2), $\alpha_{\mathrm{d}}$ is industry fixed effect, $\mathrm{BDG}_{\mathrm{i,q+1}}$ is Firm i's quarterly blockchain data growth in quarter $\mathrm{q+1}$, $\gamma_{\mathrm{i,q+n}}$ is year-quarter fixed effect. We include the past firm fundamentals in the model to account for persistence in firm fundamentals.

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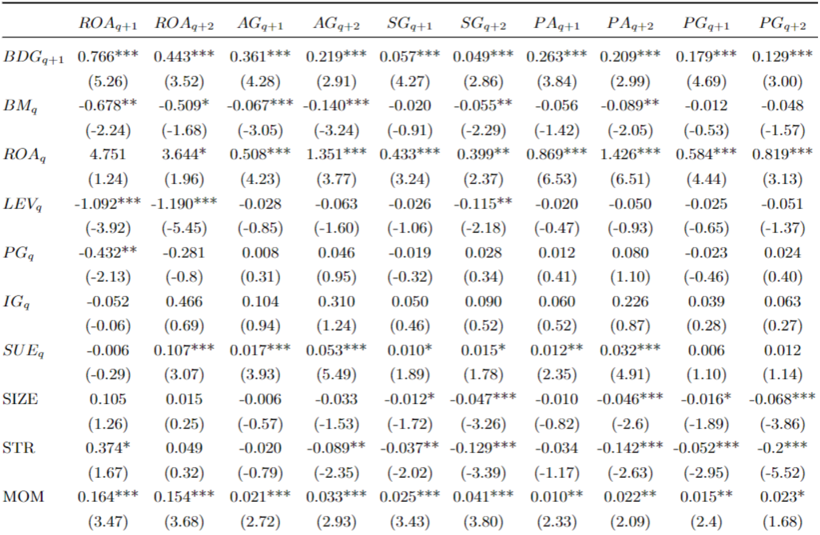
# BDG and Firm Fundamentals

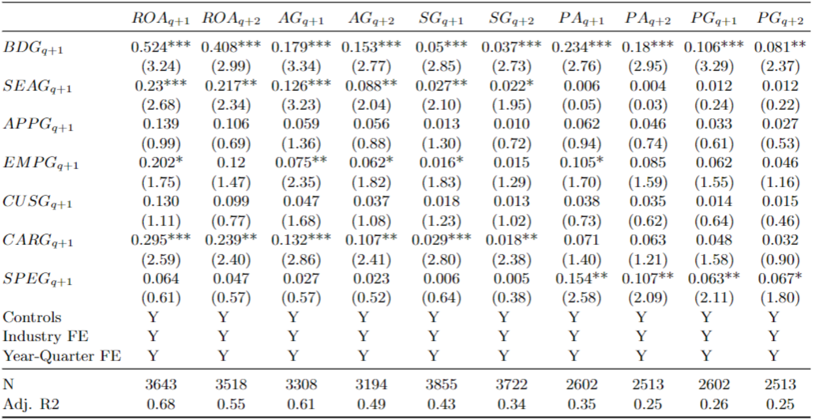


| | $ROA_{q+1}$ | $ROA_{q+2}$ | $AG_{q+1}$ | $AG_{q+2}$ | $SG_{q+1}$ | $SG_{q+2}$ | $PA_{q+1}$ | $PA_{q+2}$ | $PG_{q+1}$ | $PG_{q+2}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| $BDG_{q+1}$ | 0.766*** | 0.443*** | 0.361*** | 0.219*** | 0.057*** | 0.049*** | 0.263*** | 0.209*** | 0.179*** | 0.129*** |
| | (5.26) | (3.52) | (4.28) | (2.91) | (4.27) | (2.86) | (3.84) | (2.99) | (4.69) | (3.00) |
| $BM_q$ | -0.678** | -0.509* | -0.067*** | -0.140*** | -0.020 | -0.055** | -0.056 | -0.089** | -0.012 | -0.048 |
| | (-2.24) | (-1.68) | (-3.05) | (-3.24) | (-0.91) | (-2.29) | (-1.42) | (-2.05) | (-0.53) | (-1.57) |
| $ROA_q$ | 4.751 | 3.644* | 0.508*** | 1.351*** | 0.433*** | 0.399** | 0.869*** | 1.426*** | 0.584*** | 0.819*** |
| | (1.24) | (1.96) | (4.23) | (3.77) | (3.24) | (2.37) | (6.53) | (6.51) | (4.44) | (3.13) |
| $LEV_q$ | -1.092*** | -1.190*** | -0.028 | -0.063 | -0.026 | -0.115** | -0.020 | -0.050 | -0.025 | -0.051 |
| | (-3.92) | (-5.45) | (-0.85) | (-1.60) | (-1.06) | (-2.18) | (-0.47) | (-0.93) | (-0.65) | (-1.37) |
| $PG_q$ | -0.432** | -0.281 | 0.008 | 0.046 | -0.019 | 0.028 | 0.012 | 0.080 | -0.023 | 0.024 |
| | (-2.13) | (-0.8) | (0.31) | (0.95) | (-0.32) | (0.34) | (0.41) | (1.10) | (-0.46) | (0.40) |
| $IG_q$ | -0.052 | 0.466 | 0.104 | 0.310 | 0.050 | 0.090 | 0.060 | 0.226 | 0.039 | 0.063 |
| | (-0.06) | (0.69) | (0.94) | (1.24) | (0.46) | (0.52) | (0.52) | (0.87) | (0.28) | (0.27) |
| $SUE_q$ | -0.006 | 0.107*** | 0.017*** | 0.053*** | 0.010* | 0.015* | 0.012** | 0.032*** | 0.006 | 0.012 |
| | (-0.29) | (3.07) | (3.93) | (5.49) | (1.89) | (1.78) | (2.35) | (4.91) | (1.10) | (1.14) |
| SIZE | 0.105 | 0.015 | -0.006 | -0.033 | -0.012* | -0.047*** | -0.010 | -0.046*** | -0.016* | -0.068*** |
| | (1.26) | (0.25) | (-0.57) | (-1.53) | (-1.72) | (-3.26) | (-0.82) | (-2.6) | (-1.89) | (-3.86) |
| STR | 0.374* | 0.049 | -0.020 | -0.089** | -0.037** | -0.129*** | -0.034 | -0.142*** | -0.052*** | -0.2*** |
| | (1.67) | (0.32) | (-0.79) | (-2.35) | (-2.02) | (-3.39) | (-1.17) | (-2.63) | (-2.95) | (-5.52) |
| MOM | 0.164*** | 0.154*** | 0.021*** | 0.033*** | 0.025*** | 0.041*** | 0.010** | 0.022** | 0.015** | 0.023* |
| | (3.47) | (3.68) | (2.72) | (2.93) | (3.43) | (3.80) | (2.33) | (2.09) | (2.4) | (1.68) |

# BDG and Firm Fundamentals (continued)

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TO | 0.049 | 0.051 | 0.006 | 0.011 | 0.008 | 0.015 | 0.008 | 0.014 | 0.013 | 0.014 |
| | (0.81) | (0.90) | (0.80) | (0.70) | (0.69) | (0.81) | (1.06) | (1.17) | (0.99) | (1.09) |
| ILLIQ | 2.575 | 2.536 | 0.545 | 0.754 | 0.233 | 0.338 | 0.239 | 0.464 | 0.201 | 0.241 |
| | (0.14) | (0.17) | (0.42) | (0.47) | (0.21) | (0.18) | (0.32) | (0.31) | (0.13) | (0.15) |
| IVOL | -3.883*** | -2.156*** | 0.082 | 0.416*** | -0.101 | 0.142 | 0.079* | 0.531*** | -0.139** | 0.212* |
| | (-7.34) | (-4.61) | (1.41) | (3.53) | (-1.59) | (0.97) | (1.81) | (3.82) | (-2.14) | (1.76) |
| ANA | 0.002 | 0.003 | 0.000 | 0.000 | -0.001** | -0.001* | 0.000 | 0.000 | -0.001*** | -0.001* |
| | (0.67) | (0.78) | (-0.71) | (-0.45) | (-2.42) | (-1.71) | (-1.08) | (-0.60) | (-4.49) | (-1.88) |
| IO | 0.012*** | 0.009*** | 0.001*** | 0.002*** | 0.001*** | 0.002*** | 0.001*** | 0.001* | 0.001 | 0.001** |
| | (3.43) | (3.91) | (4.05) | (3.71) | (2.66) | (3.56) | (2.62) | (1.81) | (1.52) | (2.05) |
| $AG_q$ | | | 0.294*** | 0.158*** | | | | | | |
| | | | (4.83) | (3.92) | | | | | | |
| $SG_q$ | | | | | 0.609*** | 0.401*** | | | | |
| | | | | | (10.85) | (5.44) | | | | |
| $PA_q$ | | | | | | | 0.322*** | 0.164*** | | |
| | | | | | | | (4.84) | (3.42) | | |
| $PG_q$ | | | | | | | | | 0.197*** | 0.112*** |
| | | | | | | | | | (3.00) | (2.90) |
| Industry FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| N | 11266 | 11147 | 10807 | 10692 | 11037 | 10920 | 8047 | 7962 | 8047 | 7962 |
| Adj. R2 | 0.58 | 0.54 | 0.49 | 0.41 | 0.35 | 0.34 | 0.25 | 0.21 | 0.17 | 0.13 |

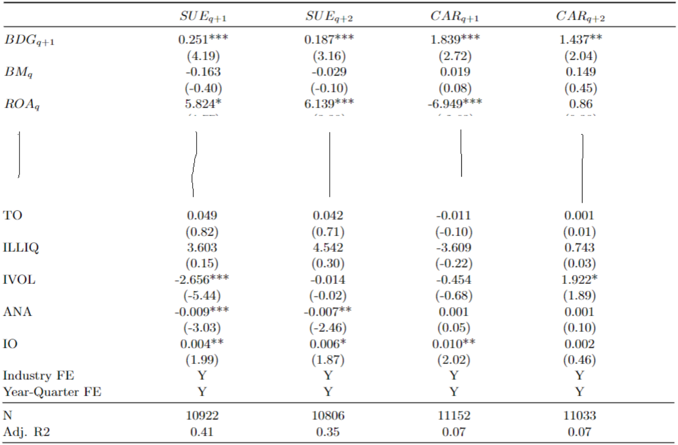
# Nowcasting Firm Fundamentals



| | $ROA_{q+1}$ | $ROA_{q+2}$ | $AG_{q+1}$ | $AG_{q+2}$ | $SG_{q+1}$ | $SG_{q+2}$ | $PA_{q+1}$ | $PA_{q+2}$ | $PG_{q+1}$ | $PG_{q+2}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| $BDG_{q+1}$ | 0.524*** | 0.408*** | 0.179*** | 0.153*** | 0.05*** | 0.037*** | 0.234*** | 0.18*** | 0.106*** | 0.081** |
| | (3.24) | (2.99) | (3.34) | (2.77) | (2.85) | (2.73) | (2.76) | (2.95) | (3.29) | (2.37) |
| $SEAG_{q+1}$ | 0.23*** | 0.217** | 0.126*** | 0.088** | 0.027** | 0.022* | 0.006 | 0.004 | 0.012 | 0.012 |
| | (2.68) | (2.34) | (3.23) | (2.04) | (2.10) | (1.95) | (0.05) | (0.03) | (0.24) | (0.22) |
| $APPG_{q+1}$ | 0.139 | 0.106 | 0.059 | 0.056 | 0.013 | 0.010 | 0.062 | 0.046 | 0.033 | 0.027 |
| | (0.99) | (0.69) | (1.36) | (0.88) | (1.30) | (0.72) | (0.94) | (0.74) | (0.61) | (0.53) |
| $EMPG_{q+1}$ | 0.202* | 0.12 | 0.075** | 0.062* | 0.016* | 0.015 | 0.105* | 0.085 | 0.062 | 0.046 |
| | (1.75) | (1.47) | (2.35) | (1.82) | (1.83) | (1.29) | (1.70) | (1.59) | (1.55) | (1.16) |
| $CUSG_{q+1}$ | 0.130 | 0.099 | 0.047 | 0.037 | 0.018 | 0.013 | 0.038 | 0.035 | 0.014 | 0.015 |
| | (1.11) | (0.77) | (1.68) | (1.08) | (1.23) | (1.02) | (0.73) | (0.62) | (0.64) | (0.46) |
| $CARG_{q+1}$ | 0.295*** | 0.239** | 0.132*** | 0.107** | 0.029*** | 0.018** | 0.071 | 0.063 | 0.048 | 0.032 |
| | (2.59) | (2.40) | (2.86) | (2.41) | (2.80) | (2.38) | (1.40) | (1.21) | (1.58) | (0.90) |
| $SPEG_{q+1}$ | 0.064 | 0.047 | 0.027 | 0.023 | 0.006 | 0.005 | 0.154** | 0.107** | 0.063** | 0.067* |
| | (0.61) | (0.57) | (0.57) | (0.52) | (0.64) | (0.38) | (2.58) | (2.09) | (2.11) | (1.80) |
| Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Industry FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| N | 3643 | 3518 | 3308 | 3194 | 3855 | 3722 | 2602 | 2513 | 2602 | 2513 |
| Adj. R2 | 0.68 | 0.55 | 0.61 | 0.49 | 0.43 | 0.34 | 0.35 | 0.25 | 0.26 | 0.25 |

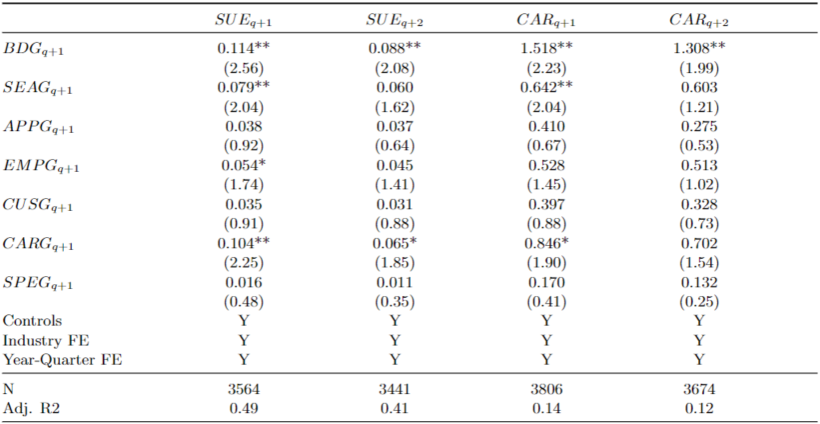
# BDG and Earnings Surprises

Livnat and Mendenhall (2006): Standardized unexpected earnings (SUE); Earnings announcement cumulative abnormal returns (CAR).



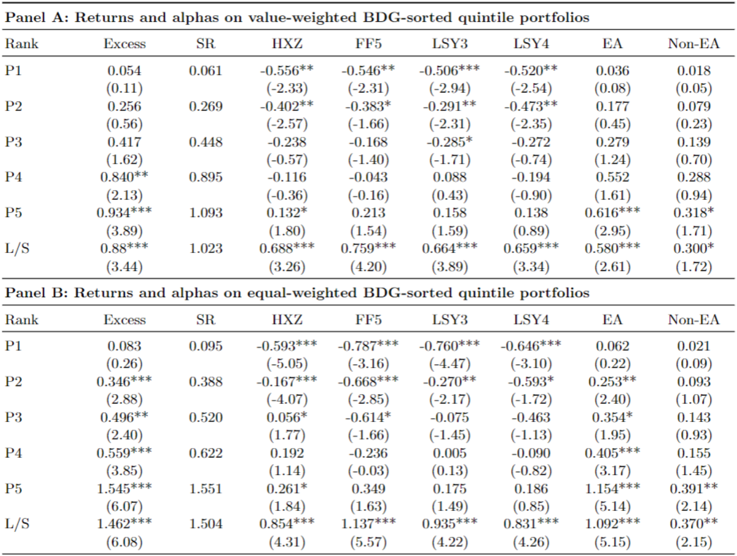
| | $SUE_{q+1}$ | $SUE_{q+2}$ | $CAR_{q+1}$ | $CAR_{q+2}$ |
|---|---|---|---|---|
| $BDG_{q+1}$ | 0.251*** | 0.187*** | 1.839*** | 1.437** |
| | (4.19) | (3.16) | (2.72) | (2.04) |
| $BM_q$ | -0.163 | -0.029 | 0.019 | 0.149 |
| | (-0.40) | (-0.10) | (0.08) | (0.45) |
| $ROA_q$ | 5.824* | 6.139*** | -6.949*** | 0.86 |
| TO | 0.049 | 0.042 | -0.011 | 0.001 |
| | (0.82) | (0.71) | (-0.10) | (0.01) |
| ILLIQ | 3.603 | 4.542 | -3.609 | 0.743 |
| | (0.15) | (0.30) | (-0.22) | (0.03) |
| IVOL | -2.656*** | -0.014 | -0.454 | 1.922* |
| | (-5.44) | (-0.02) | (-0.68) | (1.89) |
| ANA | -0.009*** | -0.007** | 0.001 | 0.001 |
| | (-3.03) | (-2.46) | (0.05) | (0.10) |
| IO | 0.004** | 0.006* | 0.010** | 0.002 |
| | (1.99) | (1.87) | (2.02) | (0.46) |
| Industry FE | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y |
| N | 10922 | 10806 | 11152 | 11033 |
| Adj. R2 | 0.41 | 0.35 | 0.07 | 0.07 |

# Nowcasting Earnings Surprises



| | $SUE_{q+1}$ | $SUE_{q+2}$ | $CAR_{q+1}$ | $CAR_{q+2}$ |
|---|---|---|---|---|
| $BDG_{q+1}$ | 0.114** | 0.088** | 1.518** | 1.308** |
| | (2.56) | (2.08) | (2.23) | (1.99) |
| $SEAG_{q+1}$ | 0.079** | 0.060 | 0.642** | 0.603 |
| | (2.04) | (1.62) | (2.04) | (1.21) |
| $APPG_{q+1}$ | 0.038 | 0.037 | 0.410 | 0.275 |
| | (0.92) | (0.64) | (0.67) | (0.53) |
| $EMPG_{q+1}$ | 0.054* | 0.045 | 0.528 | 0.513 |
| | (1.74) | (1.41) | (1.45) | (1.02) |
| $CUSG_{q+1}$ | 0.035 | 0.031 | 0.397 | 0.328 |
| | (0.91) | (0.88) | (0.88) | (0.73) |
| $CARG_{q+1}$ | 0.104** | 0.065* | 0.846* | 0.702 |
| | (2.25) | (1.85) | (1.90) | (1.54) |
| $SPEG_{q+1}$ | 0.016 | 0.011 | 0.170 | 0.132 |
| | (0.48) | (0.35) | (0.41) | (0.25) |
| Controls | Y | Y | Y | Y |
| Industry FE | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y |
| N | 3564 | 3441 | 3806 | 3674 |
| Adj. R2 | 0.49 | 0.41 | 0.14 | 0.12 |

# BDG and Stock Returns



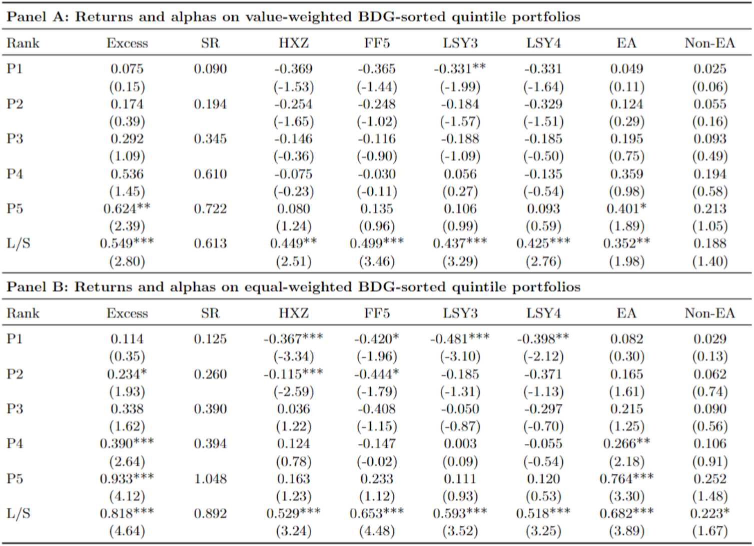
**Panel A: Returns and alphas on value-weighted BDG-sorted quintile portfolios**

| Rank | Excess | SR | HXZ | FF5 | LSY3 | LSY4 | EA | Non-EA |
|---|---|---|---|---|---|---|---|---|
| P1 | 0.054 | 0.061 | -0.556** | -0.546** | -0.506*** | -0.520** | 0.036 | 0.018 |
| | (0.11) | | (-2.33) | (-2.31) | (-2.94) | (-2.54) | (0.08) | (0.05) |
| P2 | 0.256 | 0.269 | -0.402** | -0.383* | -0.291** | -0.473** | 0.177 | 0.079 |
| | (0.56) | | (-2.57) | (-1.66) | (-2.31) | (-2.35) | (0.45) | (0.23) |
| P3 | 0.417 | 0.448 | -0.238 | -0.168 | -0.285* | -0.272 | 0.279 | 0.139 |
| | (1.62) | | (-0.57) | (-1.40) | (-1.71) | (-0.74) | (1.24) | (0.70) |
| P4 | 0.840** | 0.895 | -0.116 | -0.043 | 0.088 | -0.194 | 0.552 | 0.288 |
| | (2.13) | | (-0.36) | (-0.16) | (0.43) | (-0.90) | (1.61) | (0.94) |
| P5 | 0.934*** | 1.093 | 0.132* | 0.213 | 0.158 | 0.138 | 0.616*** | 0.318* |
| | (3.89) | | (1.80) | (1.54) | (1.59) | (0.89) | (2.95) | (1.71) |
| L/S | 0.88*** | 1.023 | 0.688*** | 0.759*** | 0.664*** | 0.659*** | 0.580*** | 0.300* |
| | (3.44) | | (3.26) | (4.20) | (3.89) | (3.34) | (2.61) | (1.72) |

**Panel B: Returns and alphas on equal-weighted BDG-sorted quintile portfolios**

| Rank | Excess | SR | HXZ | FF5 | LSY3 | LSY4 | EA | Non-EA |
|---|---|---|---|---|---|---|---|---|
| P1 | 0.083 | 0.095 | -0.593*** | -0.787*** | -0.760*** | -0.646*** | 0.062 | 0.021 |
| | (0.26) | | (-5.05) | (-3.16) | (-4.47) | (-3.10) | (0.22) | (0.09) |
| P2 | 0.346*** | 0.388 | -0.167*** | -0.668*** | -0.270** | -0.593* | 0.253** | 0.093 |
| | (2.88) | | (-4.07) | (-2.85) | (-2.17) | (-1.72) | (2.40) | (1.07) |
| P3 | 0.496** | 0.520 | 0.056* | -0.614* | -0.075 | -0.463 | 0.354* | 0.143 |
| | (2.40) | | (1.77) | (-1.66) | (-1.45) | (-1.13) | (1.95) | (0.93) |
| P4 | 0.559*** | 0.622 | 0.192 | -0.236 | 0.005 | -0.090 | 0.405*** | 0.155 |
| | (3.85) | | (1.14) | (-0.03) | (0.13) | (-0.82) | (3.17) | (1.45) |
| P5 | 1.545*** | 1.551 | 0.261* | 0.349 | 0.175 | 0.186 | 1.154*** | 0.391** |
| | (6.07) | | (1.84) | (1.63) | (1.49) | (0.85) | (5.14) | (2.14) |
| L/S | 1.462*** | 1.504 | 0.854*** | 1.137*** | 0.935*** | 0.831*** | 1.092*** | 0.370** |
| | (6.08) | | (4.31) | (5.57) | (4.22) | (4.26) | (5.15) | (2.15) |

# Public Blockchains and Stock Returns



**Panel A: Returns and alphas on value-weighted BDG-sorted quintile portfolios**

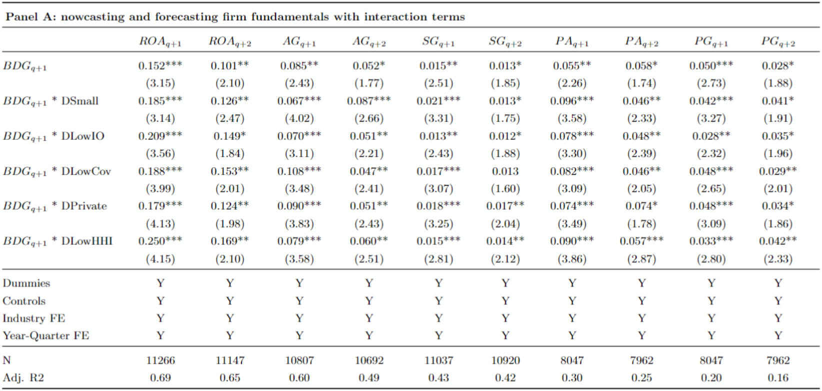
| Rank | Excess | SR | HXZ | FF5 | LSY3 | LSY4 | EA | Non-EA |
|---|---|---|---|---|---|---|---|---|
| P1 | 0.075 | 0.090 | -0.369 | -0.365 | -0.331** | -0.331 | 0.049 | 0.025 |
| | (0.15) | | (-1.53) | (-1.44) | (-1.99) | (-1.64) | (0.11) | (0.06) |
| P2 | 0.174 | 0.194 | -0.254 | -0.248 | -0.184 | -0.329 | 0.124 | 0.055 |
| | (0.39) | | (-1.65) | (-1.02) | (-1.57) | (-1.51) | (0.29) | (0.16) |
| P3 | 0.292 | 0.345 | -0.146 | -0.116 | -0.188 | -0.185 | 0.195 | 0.093 |
| | (1.09) | | (-0.36) | (-0.90) | (-1.09) | (-0.50) | (0.75) | (0.49) |
| P4 | 0.536 | 0.610 | -0.075 | -0.030 | 0.056 | -0.135 | 0.359 | 0.194 |
| | (1.45) | | (-0.23) | (-0.11) | (0.27) | (-0.54) | (0.98) | (0.58) |
| P5 | 0.624** | 0.722 | 0.080 | 0.135 | 0.106 | 0.093 | 0.401* | 0.213 |
| | (2.39) | | (1.24) | (0.96) | (0.99) | (0.59) | (1.89) | (1.05) |
| L/S | 0.549*** | 0.613 | 0.449** | 0.499*** | 0.437*** | 0.425*** | 0.352** | 0.188 |
| | (2.80) | | (2.51) | (3.46) | (3.29) | (2.76) | (1.98) | (1.40) |

**Panel B: Returns and alphas on equal-weighted BDG-sorted quintile portfolios**

| Rank | Excess | SR | HXZ | FF5 | LSY3 | LSY4 | EA | Non-EA |
|---|---|---|---|---|---|---|---|---|
| P1 | 0.114 | 0.125 | -0.367*** | -0.420* | -0.481*** | -0.398** | 0.082 | 0.029 |
| | (0.35) | | (-3.34) | (-1.96) | (-3.10) | (-2.12) | (0.30) | (0.13) |
| P2 | 0.234* | 0.260 | -0.115*** | -0.444* | -0.185 | -0.371 | 0.165 | 0.062 |
| | (1.93) | | (-2.59) | (-1.79) | (-1.31) | (-1.13) | (1.61) | (0.74) |
| P3 | 0.338 | 0.390 | 0.036 | -0.408 | -0.050 | -0.297 | 0.215 | 0.090 |
| | (1.62) | | (1.22) | (-1.15) | (-0.87) | (-0.70) | (1.25) | (0.56) |
| P4 | 0.390*** | 0.394 | 0.124 | -0.147 | 0.003 | -0.055 | 0.266** | 0.106 |
| | (2.64) | | (0.78) | (-0.02) | (0.09) | (-0.54) | (2.18) | (0.91) |
| P5 | 0.933*** | 1.048 | 0.163 | 0.233 | 0.111 | 0.120 | 0.764*** | 0.252 |
| | (4.12) | | (1.23) | (1.12) | (0.93) | (0.53) | (3.30) | (1.48) |
| L/S | 0.818*** | 0.892 | 0.529*** | 0.653*** | 0.593*** | 0.518*** | 0.682*** | 0.223* |
| | (4.64) | | (3.24) | (4.48) | (3.52) | (3.25) | (3.89) | (1.67) |

# Heterogeneity Analysis

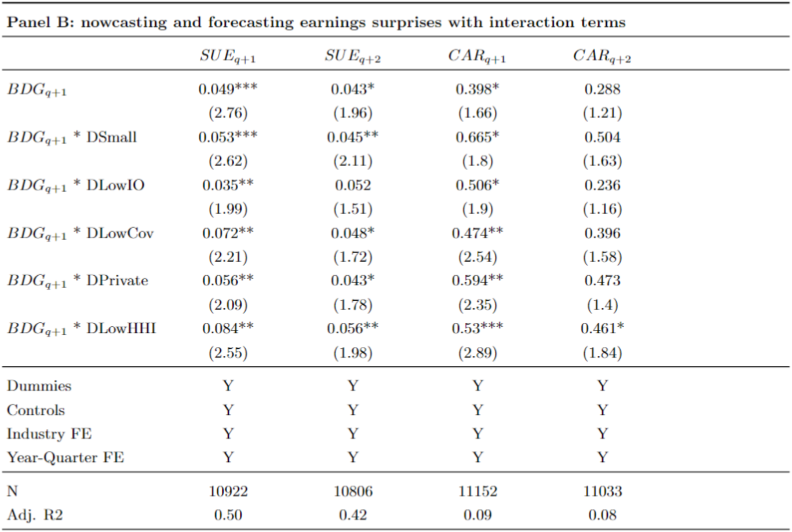
State ownership, Size, Analyst Coverage, and Institutional Ownership.



**Panel A: nowcasting and forecasting firm fundamentals with interaction terms**

| | $ROA_{q+1}$ | $ROA_{q+2}$ | $AG_{q+1}$ | $AG_{q+2}$ | $SG_{q+1}$ | $SG_{q+2}$ | $PA_{q+1}$ | $PA_{q+2}$ | $PG_{q+1}$ | $PG_{q+2}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| $BDG_{q+1}$ | 0.152*** | 0.101** | 0.085** | 0.052* | 0.015** | 0.013* | 0.055** | 0.058* | 0.050*** | 0.028* |
| | (3.15) | (2.10) | (2.43) | (1.77) | (2.51) | (1.85) | (2.26) | (1.74) | (2.73) | (1.88) |
| $BDG_{q+1}$ * DSmall | 0.185*** | 0.126** | 0.067*** | 0.087*** | 0.021*** | 0.013* | 0.096*** | 0.046** | 0.042*** | 0.041* |
| | (3.14) | (2.47) | (4.02) | (2.66) | (3.31) | (1.75) | (3.58) | (2.33) | (3.27) | (1.91) |
| $BDG_{q+1}$ * DLowIO | 0.209*** | 0.149* | 0.070*** | 0.051** | 0.013** | 0.012* | 0.078*** | 0.048** | 0.028** | 0.035* |
| | (3.56) | (1.84) | (3.11) | (2.21) | (2.43) | (1.88) | (3.30) | (2.39) | (2.32) | (1.96) |
| $BDG_{q+1}$ * DLowCov | 0.188*** | 0.153** | 0.108*** | 0.047** | 0.017*** | 0.013 | 0.082*** | 0.046** | 0.048*** | 0.029** |
| | (3.99) | (2.01) | (3.48) | (2.41) | (3.07) | (1.60) | (3.09) | (2.05) | (2.65) | (2.01) |
| $BDG_{q+1}$ * DPrivate | 0.179*** | 0.124** | 0.090*** | 0.051** | 0.018*** | 0.017** | 0.074*** | 0.074* | 0.048*** | 0.034* |
| | (4.13) | (1.98) | (3.83) | (2.43) | (3.25) | (2.04) | (3.49) | (1.78) | (3.09) | (1.86) |
| $BDG_{q+1}$ * DLowHHI | 0.250*** | 0.169** | 0.079*** | 0.060** | 0.015*** | 0.014** | 0.090*** | 0.057*** | 0.033*** | 0.042** |
| | (4.15) | (2.10) | (3.58) | (2.51) | (2.81) | (2.12) | (3.86) | (2.87) | (2.80) | (2.33) |
| Dummies | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Industry FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| N | 11266 | 11147 | 10807 | 10692 | 11037 | 10920 | 8047 | 7962 | 8047 | 7962 |
| Adj. R2 | 0.69 | 0.65 | 0.60 | 0.49 | 0.43 | 0.42 | 0.30 | 0.25 | 0.20 | 0.16 |

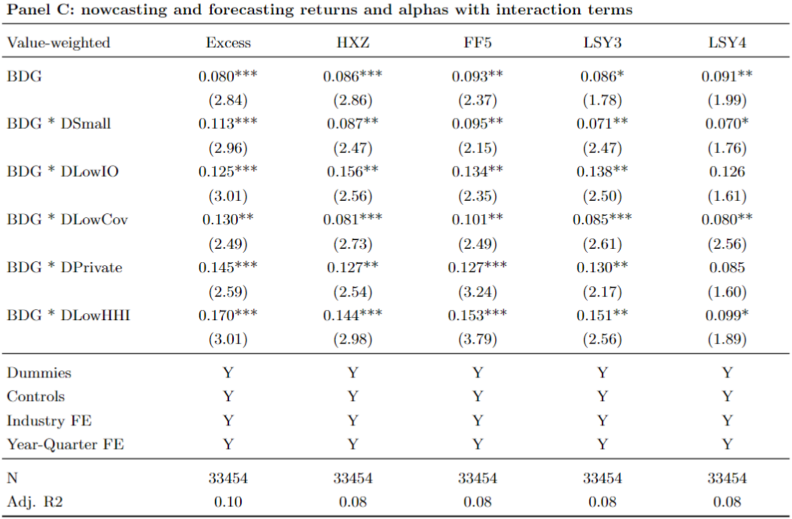
# Heterogeneity Analysis



**Panel B: nowcasting and forecasting earnings surprises with interaction terms**

| | $SUE_{q+1}$ | $SUE_{q+2}$ | $CAR_{q+1}$ | $CAR_{q+2}$ |
|---|---|---|---|---|
| $BDG_{q+1}$ | 0.049*** | 0.043* | 0.398* | 0.288 |
| | (2.76) | (1.96) | (1.66) | (1.21) |
| $BDG_{q+1}$ * DSmall | 0.053*** | 0.045** | 0.665* | 0.504 |
| | (2.62) | (2.11) | (1.8) | (1.63) |
| $BDG_{q+1}$ * DLowIO | 0.035** | 0.052 | 0.506* | 0.236 |
| | (1.99) | (1.51) | (1.9) | (1.16) |
| $BDG_{q+1}$ * DLowCov | 0.072** | 0.048* | 0.474** | 0.396 |
| | (2.21) | (1.72) | (2.54) | (1.58) |
| $BDG_{q+1}$ * DPrivate | 0.056** | 0.043* | 0.594** | 0.473 |
| | (2.09) | (1.78) | (2.35) | (1.4) |
| $BDG_{q+1}$ * DLowHHI | 0.084** | 0.056** | 0.53*** | 0.461* |
| | (2.55) | (1.98) | (2.89) | (1.84) |
| Dummies | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y |
| Industry FE | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y |
| N | 10922 | 10806 | 11152 | 11033 |
| Adj. R2 | 0.50 | 0.42 | 0.09 | 0.08 |

# Heterogeneity Analysis



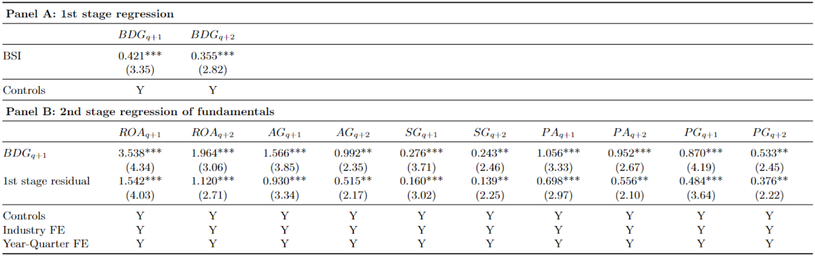
**Panel C: nowcasting and forecasting returns and alphas with interaction terms**

| Value-weighted | Excess | HXZ | FF5 | LSY3 | LSY4 |
|---|---|---|---|---|---|
| BDG | 0.080*** | 0.086*** | 0.093** | 0.086* | 0.091** |
| | (2.84) | (2.86) | (2.37) | (1.78) | (1.99) |
| BDG * DSmall | 0.113*** | 0.087** | 0.095** | 0.071** | 0.070* |
| | (2.96) | (2.47) | (2.15) | (2.47) | (1.76) |
| BDG * DLowIO | 0.125*** | 0.156** | 0.134** | 0.138** | 0.126 |
| | (3.01) | (2.56) | (2.35) | (2.50) | (1.61) |
| BDG * DLowCov | 0.130** | 0.081*** | 0.101** | 0.085*** | 0.080** |
| | (2.49) | (2.73) | (2.49) | (2.61) | (2.56) |
| BDG * DPrivate | 0.145*** | 0.127** | 0.127*** | 0.130** | 0.085 |
| | (2.59) | (2.54) | (3.24) | (2.17) | (1.60) |
| BDG * DLowHHI | 0.170*** | 0.144*** | 0.153*** | 0.151** | 0.099* |
| | (3.01) | (2.98) | (3.79) | (2.56) | (1.89) |
| Dummies | Y | Y | Y | Y | Y |
| Controls | Y | Y | Y | Y | Y |
| Industry FE | Y | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y | Y |
| N | 33454 | 33454 | 33454 | 33454 | 33454 |
| Adj. R2 | 0.10 | 0.08 | 0.08 | 0.08 | 0.08 |

# Suggestive Evidence for Causality

- Trust, transparency, and cost-saving.
- IV (Chen et al., 2021): the number of firms in the firm's industry that are leaders in developing and providing blockchain services (Blockchain Service Industry), i.e., those firms on the "List of Companies with Blockchain Digital Services" maintained by China's Cyber Security and Digitization Committee.
- Difference-in-difference; four quarters before and four after.

# Controlling for Endogeneity



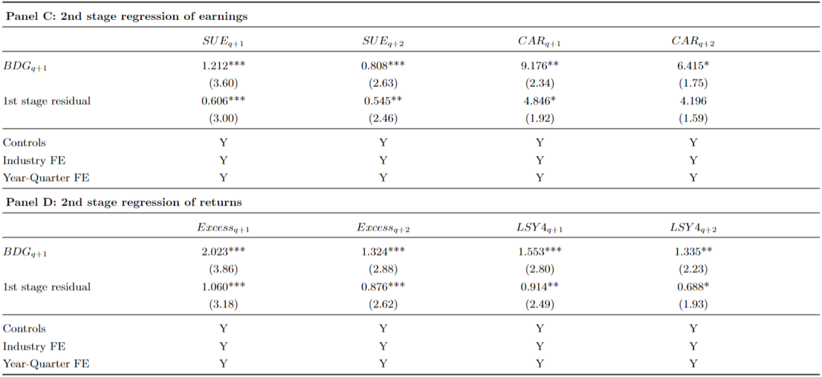
**Panel A: 1st stage regression**

| | $BDG_{q+1}$ | $BDG_{q+2}$ |
|---|---|---|
| BSI | 0.421***<br>(3.35) | 0.355***<br>(2.82) |
| Controls | Y | Y |

**Panel B: 2nd stage regression of fundamentals**

| | $ROA_{q+1}$ | $ROA_{q+2}$ | $AG_{q+1}$ | $AG_{q+2}$ | $SG_{q+1}$ | $SG_{q+2}$ | $PA_{q+1}$ | $PA_{q+2}$ | $PG_{q+1}$ | $PG_{q+2}$ |
|---|---|---|---|---|---|---|---|---|---|---|
| $BDG_{q+1}$ | 3.538*** | 1.964*** | 1.566*** | 0.992** | 0.276*** | 0.243** | 1.056*** | 0.952*** | 0.870*** | 0.533** |
| | (4.34) | (3.06) | (3.85) | (2.35) | (3.71) | (2.46) | (3.33) | (2.67) | (4.19) | (2.45) |
| 1st stage residual | 1.542*** | 1.120*** | 0.930*** | 0.515** | 0.160*** | 0.139** | 0.698*** | 0.556** | 0.484*** | 0.376** |
| | (4.03) | (2.71) | (3.34) | (2.17) | (3.02) | (2.25) | (2.97) | (2.10) | (3.64) | (2.22) |
| Controls | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Industry FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |

# Controlling for Endogeneity (continued)



**Panel C: 2nd stage regression of earnings**

| | $SUE_{q+1}$ | $SUE_{q+2}$ | $CAR_{q+1}$ | $CAR_{q+2}$ |
|---|---|---|---|---|
| $BDG_{q+1}$ | 1.212*** | 0.808*** | 9.176** | 6.415* |
| | (3.60) | (2.63) | (2.34) | (1.75) |
| 1st stage residual | 0.606*** | 0.545** | 4.846* | 4.196 |
| | (3.00) | (2.46) | (1.92) | (1.59) |
| Controls | Y | Y | Y | Y |
| Industry FE | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y |

**Panel D: 2nd stage regression of returns**

| | $Excess_{q+1}$ | $Excess_{q+2}$ | $LSY4_{q+1}$ | $LSY4_{q+2}$ |
|---|---|---|---|---|
| $BDG_{q+1}$ | 2.023*** | 1.324*** | 1.553*** | 1.335** |
| | (3.86) | (2.88) | (2.80) | (2.23) |
| 1st stage residual | 1.060*** | 0.876*** | 0.914** | 0.688* |
| | (3.18) | (2.62) | (2.49) | (1.93) |
| Controls | Y | Y | Y | Y |
| Industry FE | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y |

# Difference-in-difference Analysis

**Panel A: difference-in-difference tests of fundamentals**

| | ROA | AG | SG | PA | PG |
|---|---|---|---|---|---|
| Treat*Post | 0.152*** | 0.112*** | 0.058** | 1.224*** | 1.286** |
| | (3.91) | (3.13) | (2.32) | (3.47) | (2.57) |
| Treat | 0.099 | 0.069 | 0.040 | 0.819 | 0.817 |
| | (1.49) | (1.02) | (0.86) | (0.99) | (0.74) |
| Post | 0.060 | 0.047 | 0.025 | 0.546 | 0.462 |
| | (0.89) | (0.59) | (0.36) | (0.45) | (0.64) |
| Controls | Y | Y | Y | Y | Y |
| Industry FE | Y | Y | Y | Y | Y |
| Year-Quarter FE | Y | Y | Y | Y | Y |

**Panel B: difference-in-difference tests of earnings**

| | SUE | CAR |
|---|---|---|
| Treat*Post | 0.152*** | 0.147*** |
| | (6.22) | (5.36) |
| Treat | 0.111** | 0.083 |
| | (2.25) | (1.49) |
| Post | 0.065 | 0.072 |
| | (1.18) | (1.10) |
| Controls | Y | Y |
| Industry FE | Y | Y |
| Year-Quarter FE | Y | Y |

**Panel C: difference-in-difference tests of returns**

| | Excess | LSY4 |
|---|---|---|
| Treat*Post | 0.112*** | 0.088*** |
| | (4.36) | (3.55) |
| Treat | 0.067* | 0.060* |
| | (1.75) | (1.69) |
| Post | 0.042 | 0.041 |
| | (1.12) | (1.03) |
| Controls | Y | Y |
| Industry FE | Y | Y |
| Year-Quarter FE | Y | Y |

# Other Findings

- Observability and pricing efficiency.
- Robustness in subsamples: manufacturing vs. non-manufacturing; pre- vs. post- COVID-19; Top 5 provinces vs. others.
- International evidence from Indonesia, Malaysia, South Korea, and Thailand.
- BDG in supply chains.

# Conclusion

- BDG forecasting and nowcasting firm fundamentals.
- Trust, transparency, and cost-saving.
- Impact of on-chain data growth on public market valuation.
- Blockchain without crypto.