Information at Your Fingertips: Mobile Internet and Analyst Forecast Performance

Bingxu Fang

Sterling Huang

Singapore Management University

Sugata Roychowdhury

Northwestern University

Ewa Sletten

The Ohio State University

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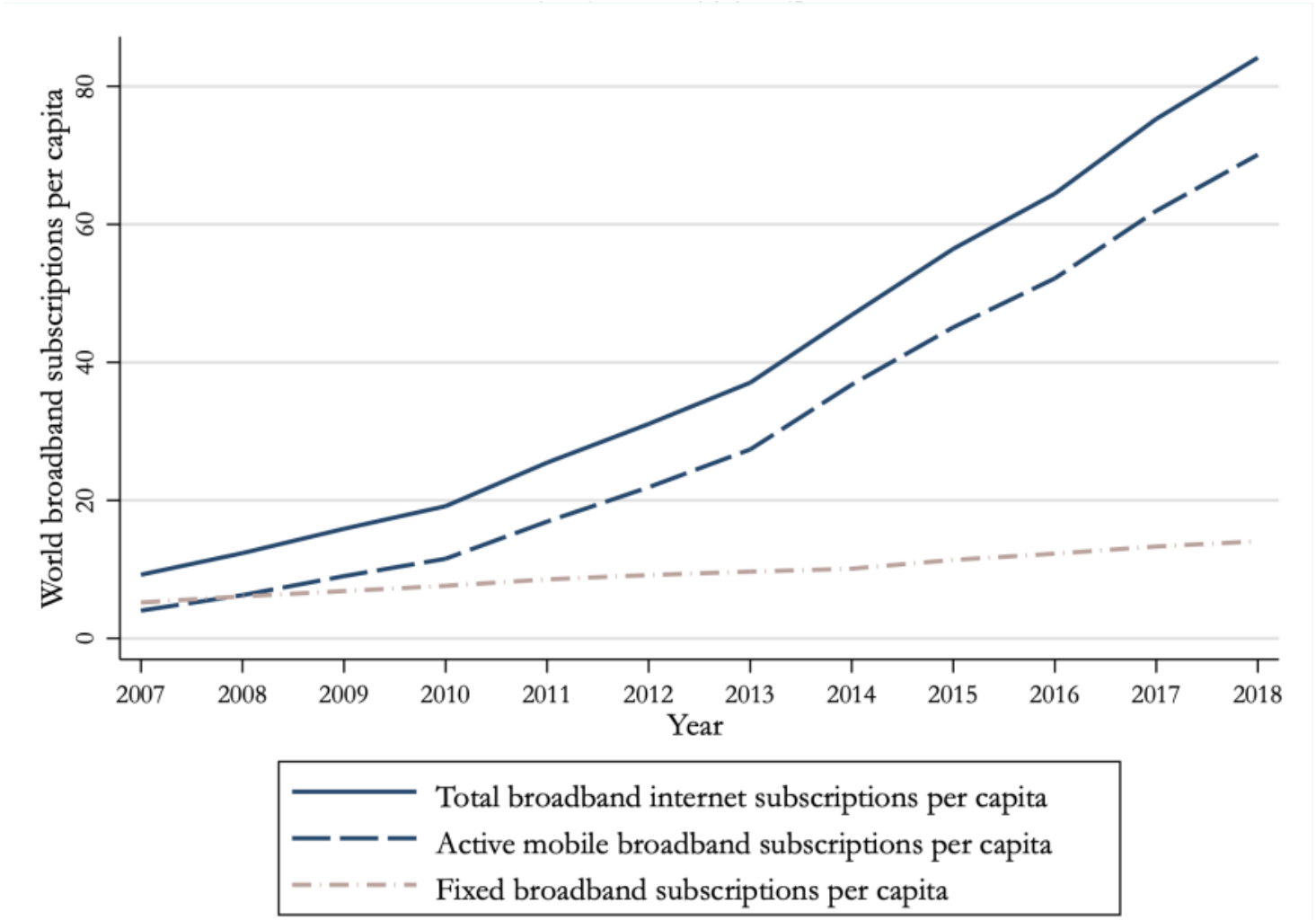
The Landscape of Internet Access



Mobile Internet access:
2007: 4%
2018: 70%

Figure: Guriev et al. (QJE 2020)
Data Source: ITU (2019)

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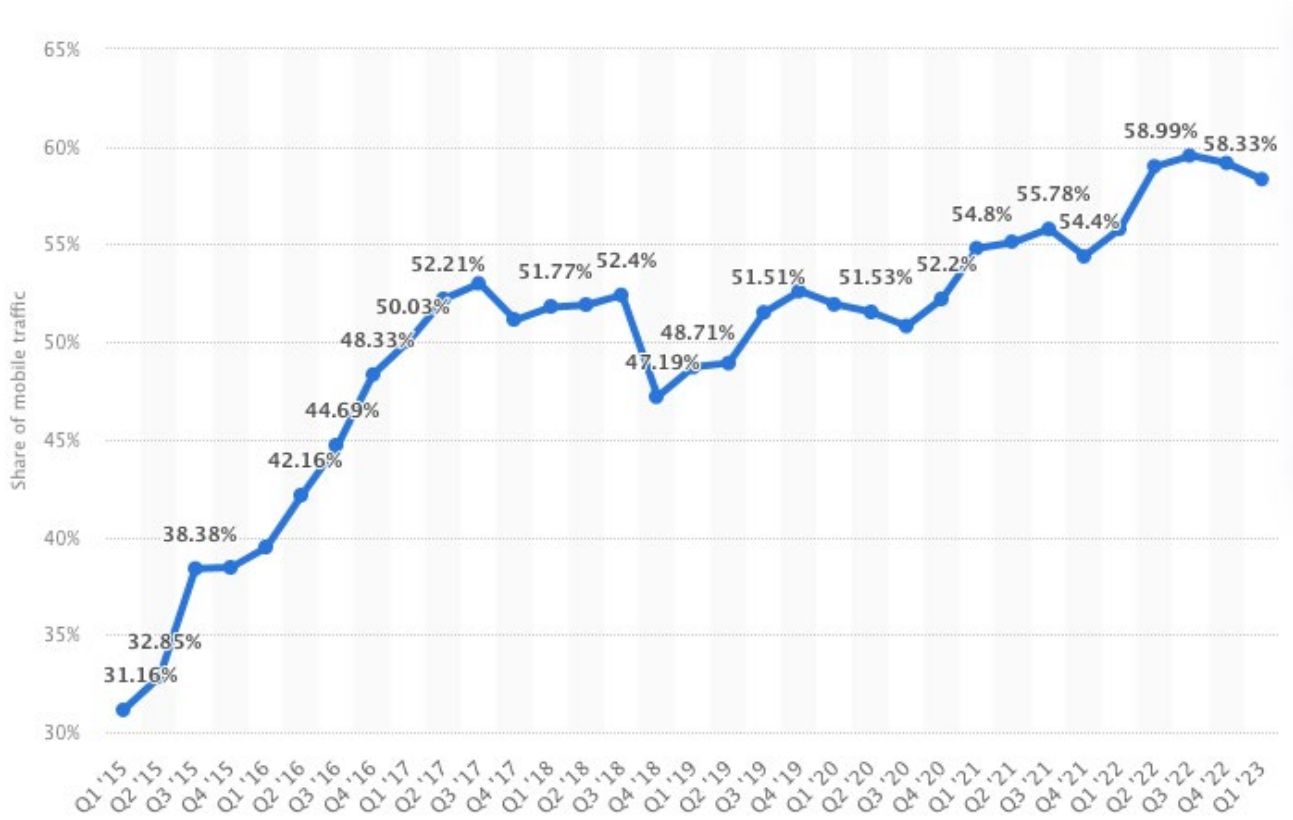
The Landscape of Internet Access



Source: Statista

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Mobile Technology & Capital Markets

A meaningful percentage of capital market activities can be traced to mobile devices

- 50% of visits to IR websites in 2014 (PR Newswire 2014)
- 31% of visits to press releases (PR Newswire 2014)
- 1.8 billion proxy ballots in 2014 (Murphy 2015)
- Investment research: 63% of institutional investors and 34% of retail investors (Smith 2016)
- 36% of retail trades in 2018 (IG Analyst 2018)
- 250+ firms with active IR apps on iOS App Store (Grant 2020)

Mobile Technology & Capital Markets

Cossette (2014): Dallas-based James Wicklund (energy specialist & equity research analyst at Credit Suisse) typically listens to several earnings call podcasts while driving to his ranch

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Mobile Technology & Capital Markets

SEC plans mobile-first approach to data

Published Jan. 10, 2016

Accenture will reportedly help modernize the SEC's website and better enable public access to company filings via **mobile devices**.

Research Question:

Conceptually: How does mobile technology affect capital market participants' information activities?

Implementation:

The staggered rollout of 3G network in U.S. counties

+

The quality of sell-side analysts' research outputs

Why 3G?

- Initially introduced in 2001, but took years till 2008 to gain popularity in most countries (along with the introduction of iPhone 3G).
- The first generation of mobile networks that enable seamless access to the Internet on the go.
- Bipartisianpolicy.org: “When 3G networks first came online (…), it was like trading a Ford Taurus in for a Formula One car.”
- Activities enabled: mobile web surfing, 24/7 internet connection, emails, video conferencing, multimedia streaming, mobile maps and directions, simultaneously accessing voice and data, resulted in the development of many applications.

Productivity Hypothesis

- Financial analysts value uninhibited access to information for professional consumption enabled by 3G network.
  - More timely access to news events, earnings releases, stock price changes, private communication with managers.
  - Lowers costs of information awareness, acquisition, and integration by providing information even when analysts are away from their desks.
  - Not perfectly substitutable by broadband access, given limited time & resource for analysts (Cohen et al. 2014; deHaan et al. 2015; Harford et al. 2019).

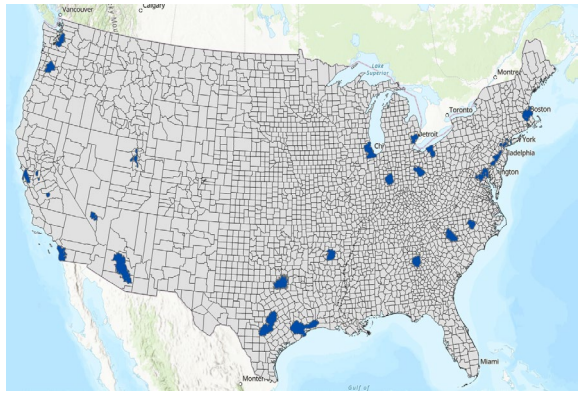
Distraction Hypothesis

- Analysts' performance may be negatively affected by information overload or distracted by information for private consumption:
  - Analysts subject to cognitive distraction from various events (deHaan et al. 2017; Bourveau et al. 2022; Du 2023).
  - Entertainment and personal communication apps inhibit information acquisition and integration (Thompson et al. 2013).
  - Mobile internet distractions impede sophisticated investors' stock-market participation (Brown, Elliott, Wermers, and White, 2022) .

Data

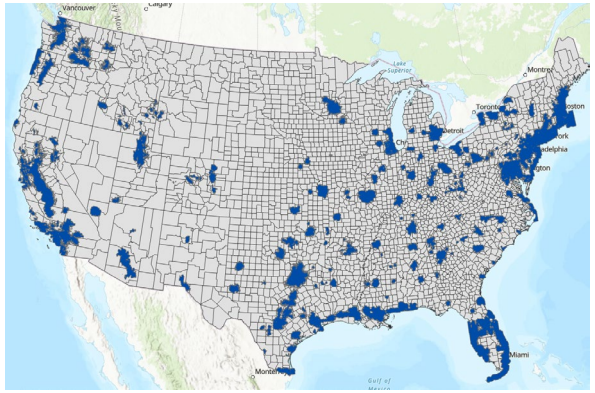
- 3G coverage: digital maps from Collins Bartholomew's Mobile Coverage Explorer
  - Compile coverage data submitted by mobile network operators to the GSM Association, 2007-2018
  - 3G availability for each 1x1-km area
  - Link the digital map to each county in the U.S.
  - Calculate the population-weighted coverage ratio for each U.S. county from 2007-2017

3G Expansion in the U.S.



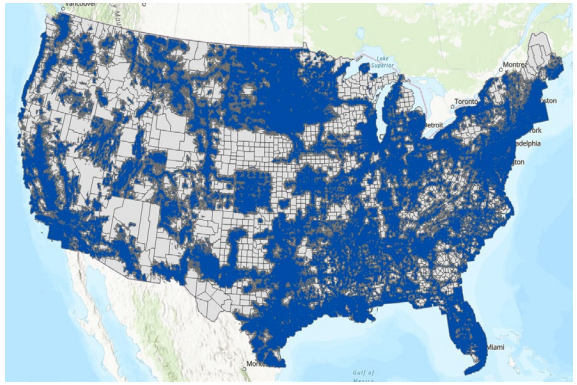
2007

7.5%



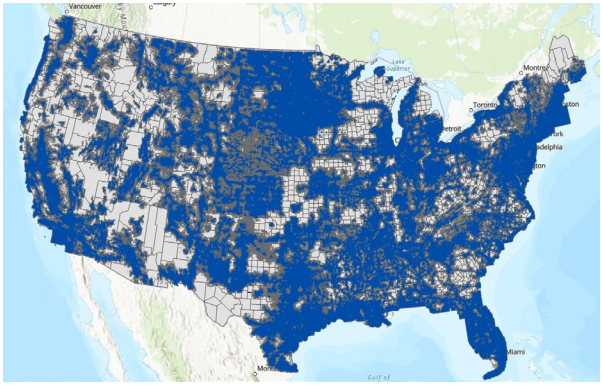
2010

39.8%



2013

95.5%



2016

97.9%

Stagggered expansion of 3G mobile internet allows us to compare forecast characteristics for a given firm-year conditional on analysts' varying access to mobile internet given the year and their location.

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Data

- Analyst location: BrokerCheck
  - Full names & broker information: IBES, Capital IQ, IBES translation file
  - Search FINRA's BrokerCheck
  - Full history of analysts' work address at the branch level
  - Use zip code to assign analysts into counties

  - Advantages over LinkedIn & Nelson's: mandatory, historical, detailed
  - Work address as a good approximation of analysts' daily activities

Main Variables

Timeliness
– leader-follower ratio based on analyst's annual EPS forecasts issued during year t (Cooper et al. 2001;Shroff et al, 2014)

Accuracy
– absolute value of the difference between the analyst's last annual forecast and actual value of EPS, scaled by stock price (*-100).

3G Coverage
– percentage of the county of the analyst's work address covered by the 3G network in year t.

Source of variation:
1. rollout of 3G network
2. Analysts moving across counties

286,163 analysts-firm-year observations spanning 2007-2017

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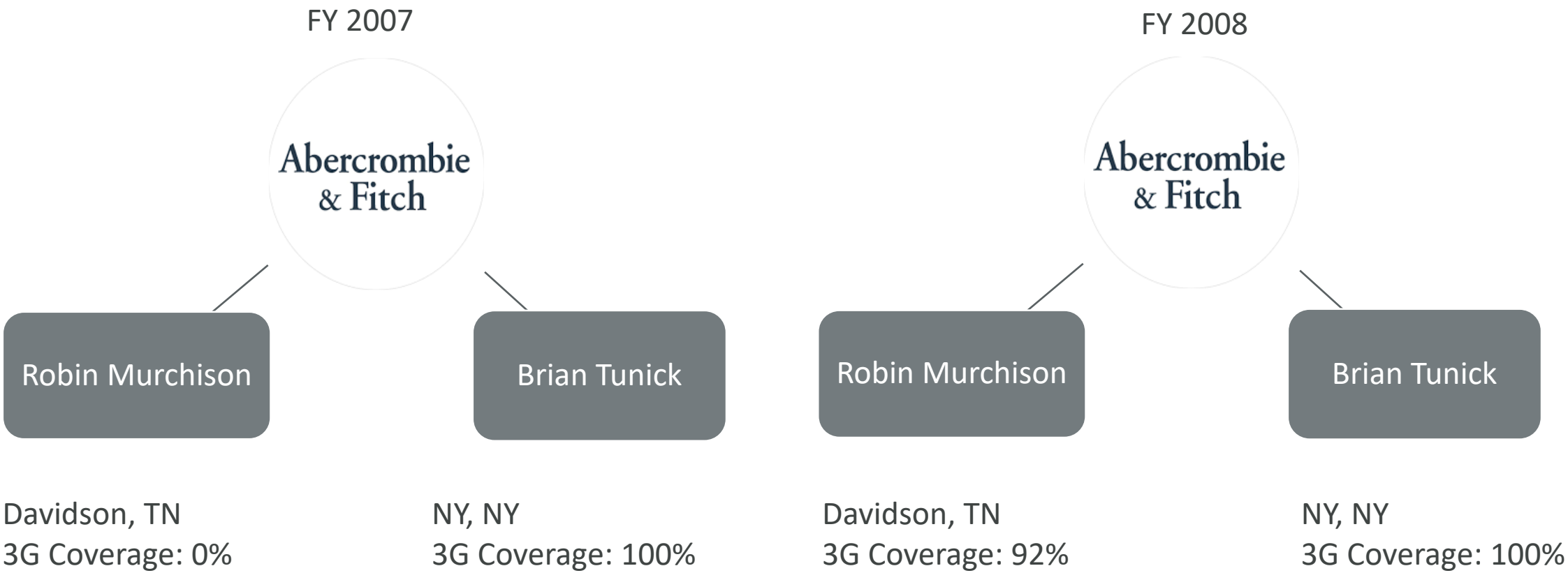
Table 1 - Analyst Forecast Distribution

Panel A: Distribution by Year			
Year	Freq. of Forecasts	Pct.	Unique Analysts
2007	19,380	6.77	1,781
2008	20,709	7.24	1,827
2009	21,361	7.46	1,852
2010	24,070	8.41	2,041
2011	26,490	9.26	2,223
2012	28,132	9.83	2,326
2013	28,900	10.10	2,368
2014	30,101	10.52	2,358
2015	30,414	10.63	2,341
2016	28,915	10.10	2,274
2017	27,691	9.68	2,153
Total	286,163	100	3,947

Research Design

$$Forecast_{ijt} = \beta_0 + \beta_1 3G\ Coverage_{it} + \gamma' X_{ijt} + Firm*YearFE + AnalystsFE + CountyFE + \varepsilon_{ijt}$$



Firm-Year FEs, Analyst FEs, County FEs

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Effect of Mobile Internet on Forecast Timeliness & Accuracy

- Analyst **forecast timeliness and accuracy improve** when analysts have expanded access to mobile internet.
- Economic magnitudes: 21 percentage point(i.e.,the mean increase in local 3G coverage in our sample) increase in 3G access, leads to:
  - 2.2% increase in timeliness
  - 8.1% increase in accuracy relative to sample mean

	(1) *Timeliness*	(2) *Accuracy*
3G Coverage	**0.293*** **	**0.139*** **
	(2.64)	**(2.71)**
Horizon		-0.002***
		(-5.72)
Effort		-0.001
		(-0.24)
Firm Experience	0.005**	0.001
	(2.07)	(0.41)
General Experience	0.308***	0.052
	(13.74)	(0.94)
# Covered Firms	-0.002	0.003*
	(-0.84)	(1.95)
# Covered Industries	-0.011	0.006
	(-1.36)	(0.64)
Broker Size	0.153***	-0.001
	(9.98)	(-0.09)
Observations	286,163	286,163
Adj. R-squared	0.338	0.567
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Effect of Mobile Internet on Forecast Timeliness & Accuracy

- **Discrete treatment differences-in-differences** model.
- Treatment: **Sharp Increase** in 3G coverage (i.e. >50 percentage point increase).
- Economic magnitudes: sharp increases lead to:
  - 6% increase in timeliness
  - 13.6% increase in accuracy

	(3) *Timeliness*	(4) *Accuracy*
Sharp Increase	**0.170*** **	**0.049*** **
	(4.66)	**(2.99)**
Horizon		-0.001***
		(-31.91)
Effort		0.002
		(0.70)
Firm Experience	0.005**	0.002***
	(2.01)	(3.46)
General Experience	0.001	-0.031***
	(0.27)	(-3.10)
# Covered Firms	0.000	-0.000
	(0.17)	(-0.40)
# Covered Industries	-0.006	0.010*
	(-0.59)	(1.96)
Broker Size	0.311***	-0.002
	(3.98)	(-0.11)
Observations	217,664	217,664
Adj. R-squared	0.292	0.526
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Parallel Trend and Stacked DID

	Parallel Trend	
	Timeliness	*Accuracy*
D(t=-2)	-0.002	0.048
	(-0.02)	(0.70)
D(t=-1)	0.041	-0.033
	(0.48)	(-0.99)
D(t=1)	0.143	**0.059****
	(1.48)	**(2.19)**
D(t=2)	**0.256*****	0.035
	(2.74)	(1.61)
D(t=3)	**0.277****	**0.039*****
	(2.56)	**(2.80)**

- **Discrete treatment differences-in-differences** model based on Sharp Increases in 3G coverage.
- **No significant differences** between treated and control observations **in pre-treatment years.**

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Robustness Analyses

- Results are robust to
  - using stacked approach to correct for potential bias of staggered treatment
  - excluding analysts based in NY.
  - using first instead of last forecast.
  - an alternative measure of timeliness based on analysts' reactions to EA

Instrumental Variable Regression

- Instrument: Frequency of **lightning strikes** in the county.
- High frequency of lightning strikes in the local area increases 3G maintainance costs → hinders the rollout of mobile technology (Manacorda and Tesei 2020; Guriev et al. 2021).

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Instrumental Variable Regression

- Results support causal interpretation that 3G expansion leads to improved forecast quality.

	(1) First-Stage *3G Coverage*	(2) Second-Stage *Timeliness*	(3) First-Stage *3G Coverage*	(4) Second-Stage *Accuracy*
3G Coverage		**0.175*** **		**0.219** **
		(3.47)		**(2.51)**
High Lightning*Year	**-0.125*** **		**-0.114*** **	
	(-8.36)		**(-7.65)**	
Other Controls	Yes	Yes	Yes	Yes
Observations	286,163	286,163	286,163	286,163
Cragg-Donald Wald F-stat	69.83		60.52	
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Analysts FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes

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Business Insider:
“Bloomberg Immediately became one of the top most popular apps in the market, revered for its clean design and seamless integration with Apple’s OS software… It created excitement in the financial industry, and is relied on by millions of users each week”.

Launch of Bloomberg App

- Bloomberg App was launched on July 16 2008.
- We conduct differences-in-differences tests using the launch event.
- Treated analysts are those located in counties with above 50% 3G coverage in 2007.
- "Post" takes the value of one for 2009-2011.
- Post-launch improvements in timeliness and accuracy are significantly higher for analysts with good 3G coverage.

	(1) *Timeliness*	(2) *Accuracy*
Treat*Post	**0.170***** **(4.66)**	**0.050**** **(2.37)**
Horizon		-0.002*** (-8.30)
Effort		0.009** (2.11)
Firm Experience	0.005** (2.01)	-0.001 (-0.18)
General Experience	0.001 (0.27)	-0.004*** (-7.22)
# Covered Firms	0.000 (0.17)	-0.011** (-2.32)
# Covered Industries	-0.006 (-0.59)	0.029*** (3.38)
Broker Size	0.311*** (3.98)	0.045** (2.11)
Observations	123,680	123,680
Adj. R-squared	0.292	0.469
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Role of Productivity Apps

- Apps download data obtained from QIMAI.com.
- Productivity Apps include News and Business Apps.
- *MoreProdApps* –is an indicator that takes a value of one if the percentage of productivity apps in the Top 200 App Ranking in year t is higher than the sample median
- Improvements in timeliness and accuracy with the popularity of productivity apps and analysts' access to mobile internet.

	(1) *Timeliness*	(2) *Accuracy*
3G Coverage*MoreProdApps	**0.019*****	**0.096****
	(5.74)	**(1.97)**
3G Coverage	-0.005	0.126
	(-0.22)	(1.06)
Horizon		-0.002***
		(-5.57)
Effort		-0.006
		(-0.93)
Firm Experience	0.006***	0.013
	(12.30)	(1.21)
General Experience	0.084***	0.372
	(12.15)	(1.00)
# Covered Firms	0.002***	0.004***
	(4.95)	(2.83)
# Covered Industries	-0.002	0.004
	(-1.46)	(0.38)
Broker Size	0.020***	-0.018*
	(6.78)	(-1.87)
Observations	221,300	221,300
Adj. R-squared	0.464	0.587
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Distraction from Entertainment Apps

- Entertainment Apps include Games and Social Apps.
- *MoreEntertainmentApps* – is an indicator that takes a value of one if the percentage of entertainment apps in the Top 200 App Ranking in year t is higher than the sample median
- More distraction effects with the popularity of more entertainment Apps

	(1) *Timeliness*	(2) *Accuracy*
3G Coverage*MoreEntertainApps	**-0.032****	**-0.556**
	(-2.20)	**(-1.34)**
3G Coverage	0.022	0.730*
	(0.83)	(1.74)
Horizon		-0.002***
		(-4.53)
Effort		-0.006
		(-0.82)
Firm Experience	0.006***	0.013
	(10.49)	(1.06)
General Experience	0.084***	0.372
	(12.14)	(0.70)
# Covered Firms	0.002***	0.005**
	(4.97)	(2.55)
# Covered Industries	-0.002	0.004
	(-1.46)	(0.38)
Broker Size	0.020***	-0.018*
	(7.24)	(-1.95)
Observations	221,300	221,300
Adj. R-squared	0.464	0.587
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Event-based Analyses- Revision following corporate news

- Corporate News from RavenPack.
- High Impact News: sentiment score >0.5 or <-0.5 (Bounded by -1 and 1)
- Analysts revision within [0,1] days following the release of corporate news.

	(1)
	Revision
3G Coverage	**0.005*** **
	(2.64)
Firm Experience	0.001***
	(13.83)
Gen Experience	0.020***
	(16.47)
# Covered Firms	0.001***
	(9.12)
# Covered Industries	0.000
	(0.69)
Broker Size	0.005***
	(8.91)
EA Event	0.464***
	(35.11)
Observations	1,595,890
Adj. R-squared	0.341
Firm*Year FE	Yes
Analyst FE	Yes
County FE	Yes

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Distraction Events-Local Sport Events

- Corporate News from RavenPack.
- High Impact News: sentiment score >0.5 or <-0.5 (Bounded by -1 and 1)
- Analysts revision within [0,1] days following the release of corporate news.
- Distraction Events within [0,1] days of the corporate news.
- Local College Football and March Madness

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Distraction Events-Local Sport Events

- Corporate News from RavenPack.
- High Impact News: sentiment score >0.5 or <-0.5 (Bounded by -1 and 1)
- Analysts revision within [0,1] days following the release of corporate news.
- Distraction Events within [0,1] days of the corporate news.
- Local College Football and March Madness

	(1) *Revision*	(2) *Revision*	(3) *Revision*
3G Coverage	**0.005*** **	**0.005***	**0.006** **
	(2.64)	**(1.96)**	**(2.11)**
Sports Events		-0.023***	-0.011
		(-13.72)	(-1.47)
3G * Sports Events			**-0.013***
			(-1.73)
Firm Experience	0.001***	0.001***	0.001***
	(13.83)	(13.82)	(13.82)
Gen Experience	0.020***	0.020***	0.020***
	(16.47)	(16.48)	(16.49)
# Covered Firms	0.001***	0.001***	0.001***
	(9.12)	(9.15)	(9.14)
# Covered Industries	0.000	0.000	0.000
	(0.69)	(0.69)	(0.69)
Broker Size	0.005***	0.005***	0.005***
	(8.91)	(8.91)	(8.92)
EA Event	0.464***	0.464***	0.464***
	(35.11)	(35.00)	(35.00)
Observations	1,595,890	1,595,890	1,595,890
Adj. R-squared	0.341	0.341	0.341
Firm*Year FE	Yes	Yes	Yes
Analyst FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes

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After-Hours News Events

- Corporate News from RavenPack.
- High Impact News: sentiment score >0.5 or <-0.5 (Bounded by -1 and 1)
- Analysts revision within [0,1] days following the release of corporate news.
- Use analysts' zip codes to assign them to different time zones
- After Hour: If the news event happens at 8 PM local time

	(1) *Revision*	(2) *Revision*
3G Coverage	**0.006****	**0.005****
	(2.40)	**(2.09)**
After Hour	-0.013***	-0.032***
	(-4.16)	(-3.30)
3G * After Hours		**0.020****
		(2.00)
Firm Experience	0.001***	0.001***
	(10.77)	(10.76)
Gen Experience	0.020***	0.020***
	(16.14)	(16.14)
Portfolio Size	0.001***	0.001***
	(8.52)	(8.53)
Number of Industries	0.000	0.000
	(0.81)	(0.81)
Broker Size	0.005***	0.005***
	(8.22)	(8.20)
EA Event	0.463***	0.463***
	(35.76)	(35.77)
Observations	1,595,890	1,595,890
Adj. R-squared	0.339	0.339
Firm*Year FE	Yes	Yes
Analyst FE	Yes	Yes
County FE	Yes	Yes

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Additional Tests

- Consistent findings by looking at
  - Analysts' target price accuracy
  - Informativeness of stock recommendations
  - Career outcomes (e.g., Allstar status, employment at Top10 brokers)

Conclusion

- Mobile connectivity and uninterrupted access to information improve analysts' research performance.
- For financial analysts, usefullness of mobile internet as a work resource dominates the distraction effect.
- Our research implies that mobile technology engenders a positive information feedback loop:
  - Improved access to information begets additional valuable information.

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Contribution

- The literature on how mobile technology affects information acquisition & sharing, and the real effects
  - Trust in government (Guriev et al. 2021)
  - Coordination of protests (Manacorda and Tesei 2020)
  - Financial information search activity & trading volume (Brown et al. 2015, Brown et al. 2020)
  - Deterrence of corporate misconduct (Hesse and Pacelli 2023)
- The emerging literature on the role of technology in the capital markets
  - Fintech (e.g., Estimize, Robo-Analysts)
  - Financial social media (e.g., SA, Reddit)
  - Non-financial technology (e.g., translation technology)

Thank you

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Tables

The Landscape of Internet Access

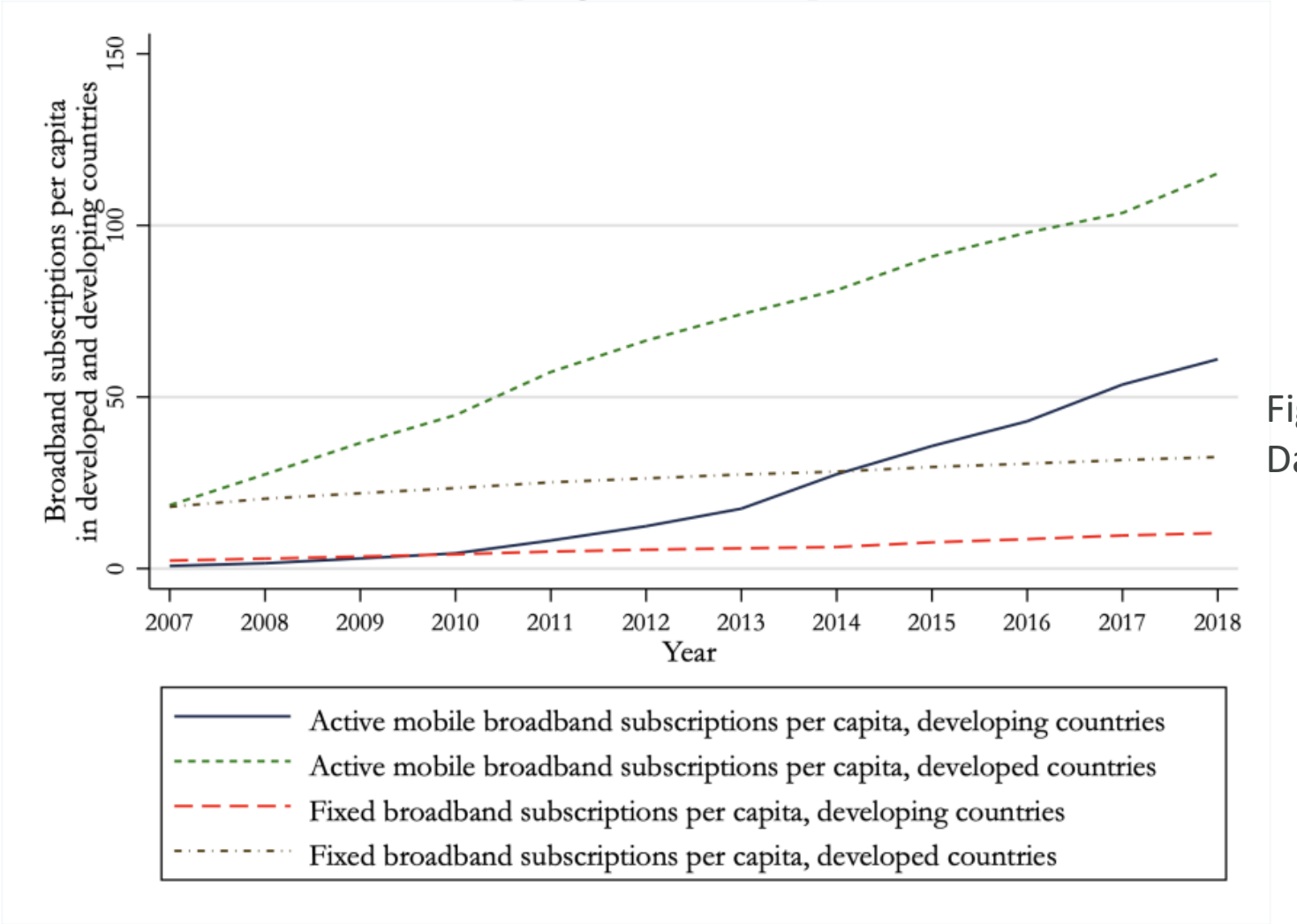

Figure: Guriev et al. (QJE 2020)
Data Source: ITU (2019)

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The Competing Hypotheses

- Productivity Effects
  - Timely access to information, private communication via emails or Apps
  - serves as a work tool that lowers information acquisition costs

- Distraction Effects
  - Attention is drawn away by social media, games, or other information

- An empirical question ex ante

Mobile Internet and Information Dissemination

- Mobile internet facilitates swift and continuous dissemination of various types of information:
  - Information for professional consumption (e.g., news, private communications).
    - Can help improve productivity and output quality.
    - But can also lead to information overload.
  - Information for personal consumption (e.g., social media, games).
    - Distracts from the professional task at hand.
- Both types of information are accessible all the time.

Preview of Main Findings

- The productivity effects dominate.

- The staggered rollout of 3G coverage is associated with:
  - Timelier & more accurate earnings forecasts
  - More informative stock recommendations
  - Better career outcomes for analysts
  - More accurate target prices

- Using lightning strikes as an IV for 3G rollout
- DID analyses exploiting the introduction of the Bloomberg App in 2008.
- Stronger effects with more productivity Apps
- Distraction effects dominants with more rollout of entertainment Apps
- Event-based Analyses
  - More timely revisions upon release of non-earnings corporate news
  - Less timely revisions when the release of corporate news coincides with local sports events.

Related Studies

- Brown et al. (2015): Distracted Driving Laws weaken the liquidity & information searches for local firms
  - We directly identify analysts' locations
  - Access to the mobile Internet is a more fundamental question

- Brown et al. (2022): BIS outages lead to more stock trades
  - Our evidence sheds more light on the productivity hypothesis
  - Our setting is more general and the effects are likely more widespread

Mobile Internet – Effect on Analyst Forecasts

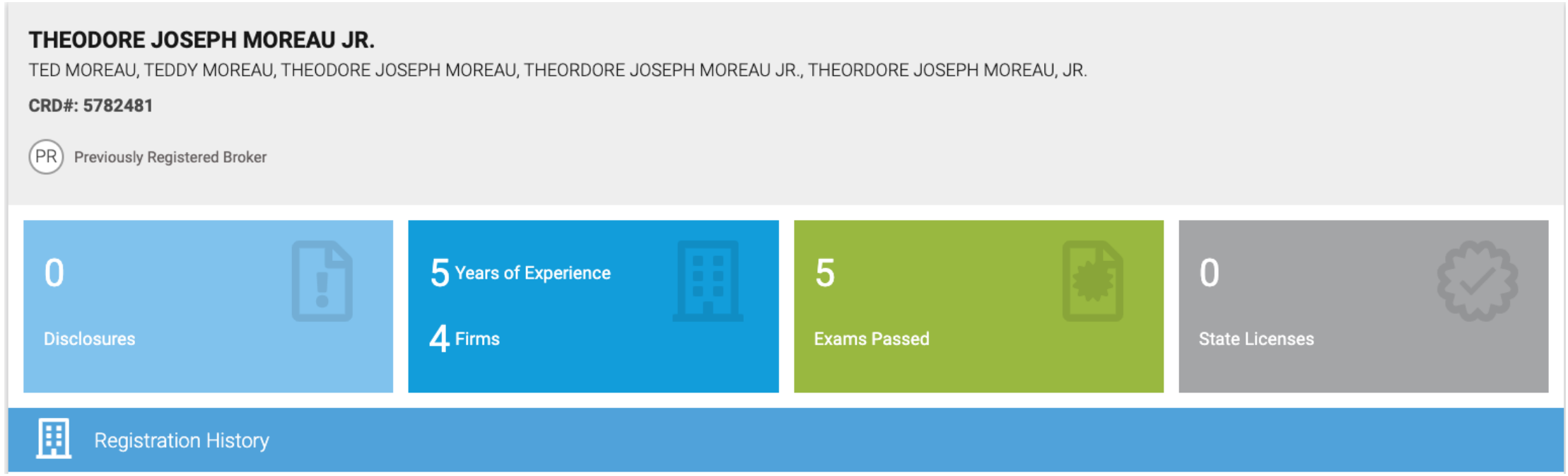
Work Resource Perspective

Swift and constant access to relevant professional information leads to *higher forecast quality*.

Distraction Source Perspective

Constant access to personal information/entertainment or information overload leads to *lower forecast quality.*

Data


THEODORE JOSEPH MOREAU JR.
TED MOREAU, TEDDY MOREAU, THEODORE JOSEPH MOREAU, THEORDORE JOSEPH MOREAU JR., THEORDORE JOSEPH MOREAU, JR.
CRD#: 5782481
PR
Previously Registered Broker
0
Disclosures
5 Years of Experience
4 Firms
5
Exams Passed
0
State Licenses
Registration History

Data

		Name	Location
B	04/23/2014 - 02/04/2016	BARRINGTON RESEARCH ASSOCIATES, INC. (CRD#:13820)	CHICAGO, IL
B	07/02/2012 - 04/30/2014	KCG AMERICAS LLC (CRD#:149823)	NEW YORK, NY
B	03/21/2012 - 07/02/2012	KNIGHT CAPITAL AMERICAS, L.P. (CRD#:38599)	JERSEY CITY, NJ
B	07/12/2010 - 11/16/2011	WJB CAPITAL GROUP, INC. (CRD#:37334) FINRA expelled the firm on 06/18/2012	NEW YORK, NY

BARRINGTON RESEARCH ASSOCIATES, INC.	161 N. CLARK ST., SUITE 2950	CHICAGO	IL	UNITED STATES	60601-3221	4/23/2014	2/4/2016		
KCG AMERICAS LLC	1633 BROADWAY	NEW YORK	NY	UNITED STATES	10019	7/2/2012	4/30/2014	41ST FLOOR	
KNIGHT CAPITAL AMERICAS, L.P.	545 WASHINGTON BLVD.	JERSEY CITY	NJ	UNITED STATES	07310-1607	3/21/2012	7/2/2012		
WJB CAPITAL GROUP, INC.	909 THIRD AVENUE	NEW YORK	NY	UNITED STATES	10022	7/12/2010	11/16/2011	9TH FLOOR	6/18/2012

Productivity Hypothesis

- More swift and uninterrupted access to information enabled by mobile technology is likely to improve analyst forecast timeliness.

- Effect on accuracy is less clear:
  - No change in accuracy if the same information is incorporated into a forecast but in a more timely fashion.
  - Accuracy improves if analysts take advantage of more swift and uninterrupted access to incorporate more information into the forecast.

The Accuracy of Target Prices

	(1) *TP Accuracy*
3G Coverage	**0.031***
	(1.78)
Firm Experience	-0.001
	(-1.44)
General Experience	-0.024
	(-1.16)
# Covered Firms	0.004*
	(1.74)
# Covered Industries	-0.001
	(-0.10)
Broker Size	0.008
	(1.27)
Observations	836,396
Adj. R-squared	0.711
Firm*Year FE	Yes
Analysts FE	Yes
County FE	Yes

Career Outcomes

- All-star status & working at large brokers are important determinants of analysts' compensation
- **Greater likelihood of All-Star** status in the following year.
- **Greater likelihood of employment at a Top10 Broker**

	(1) *Future All-Star*	(2) *Future Top10 Broker*
3G Coverage	**0.012***	**0.049****
	(1.68)	**(4.36)**
All-Star	0.380***	0.037***
	(19.36)	(3.46)
Horizon	-0.000***	-0.000***
	(-3.33)	(-3.97)
Effort	0.006***	-0.001
	(5.02)	(-0.95)
Firm Experience	-0.001	0.001
	(-0.61)	(0.68)
General Experience	-0.006	0.005
	(-1.13)	(0.68)
# Covered Firms	0.002***	-0.000
	(4.55)	(-0.60)
# Covered Industries	-0.002*	-0.002
	(-1.82)	(-1.00)
Broker Size	0.011***	0.129***
	(3.43)	(23.27)
NY	0.009	-0.005
	(1.07)	(-0.42)
Top 10 Broker		0.419***
		(28.33)
Observations	23,125	23,125
Adj. R-squared	0.692	0.799
Year FE	Yes	Yes
Broker FE	Yes	Yes

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Stock Recommendations

	(1) Buy Recommendations *CAR*	(2) Sell Recommendations *CAR*
3G Coverage	**2.225*** **(1.69)**	**-20.345***** **(-2.68)**
Observations	49,042	7,372
Controls	Yes	Yes
Firm FE	Yes	Yes
Year-Month FE	Yes	Yes
Analyst FE	Yes	Yes
County FE	Yes	Yes
Adj. R-squared	0.106	0.293

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Table 2 – Descriptive Statistics

	N	Mean	SD	Median
3G Coverage	286,163	0.96	0.16	1.00
Timeliness	286,163	2.83	3.66	1.60
Accuracy	286,163	-0.36	5.93	-0.04
All Star	286,163	0.14	0.34	0.00
Horizon	286,163	116.61	66.66	99.00
Effort	286,163	4.45	2.28	4.00
Firm Experience	286,163	4.08	4.56	3.00
General Experience	286,163	12.24	8.80	12.50
# Covered Firms	286,163	17.77	7.38	17.00
# Covered Industries	286,163	3.69	2.42	3.00
Broker Size	286,163	61.55	50.37	46.00
Lightning (Raw)	286,163	1237.73	4309.13	25.00
Log Population	286,094	13.70	1.10	14.44
Log County GDP	286,094	19.20	1.09	19.91
Log County Income	286,094	11.40	0.48	11.64
ProdApps (Raw)	221,300	2.54	0.44	2.38
Demotion	25,319	0.29	0.00	0.00
Promotion	25,319	0.15	0.00	0.00
TP Accuracy	836,396	0.38	0.41	0.26
Timeliness (Average of Dummies)	286,163	0.18	0.27	0.00

Table 3 – Mobile Internet and Forecast Attributes

	Continuous Treatment		Sharp DID		Parallel Trend		Stacked DID	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Timeliness	*Accuracy*	*Timeliness*	*Accuracy*	*Timeliness*	*Accuracy*	*Timeliness*	*Accuracy*
3G Coverage	**0.293*** **	**0.139*** **						
	(2.64)	**(2.71)**						
Sharp Increase			**0.170*** **	**0.049*** **			**0.222** **	**0.050*** **
			(4.66)	**(2.99)**			**(2.56)**	**(2.64)**
D(t=-2)					-0.002	0.048		
					(-0.02)	(0.70)		
D(t=-1)					0.041	-0.033		
					(0.48)	(-0.99)		
D(t=1)					0.143	**0.059** **		
					(1.48)	**(2.19)**		
D(t=2)					**0.256*** **	0.035		
					(2.74)	(1.61)		
D(t=3)					**0.277** **	**0.039*** **		
					(2.56)	**(2.80)**		
Horizon		-0.002***		-0.001***		-0.001***		-0.002***
		(-5.72)		(-31.91)		(-31.94)		(-12.87)
Effort		-0.001		0.002		0.003		0.005
		(-0.24)		(0.70)		(0.71)		(1.45)
Firm Experience	0.005**	0.001	0.005**	0.002***	0.004**	0.002***	0.006**	-0.001
	(2.07)	(0.41)	(2.01)	(3.46)	(2.04)	(3.46)	(2.50)	(-0.29)
General Experience	0.308***	0.052	0.001	-0.031***	0.320***	-0.031***	0.300***	-0.022
	(13.74)	(0.94)	(0.27)	(-3.10)	(13.16)	(-3.13)	(12.30)	(-0.62)
# Covered Firms	-0.002	0.003*	0.000	-0.000	-0.005*	-0.000	-0.006**	0.000
	(-0.84)	(1.95)	(0.17)	(-0.40)	(-1.96)	(-0.45)	(-2.27)	(0.29)
# Covered Industries	-0.011	0.006	-0.006	0.010*	-0.006	0.010*	-0.010	0.011
	(-1.36)	(0.64)	(-0.59)	(1.96)	(-0.51)	(1.96)	(-0.84)	(1.40)
Broker Size	0.153***	-0.001	0.311***	-0.002	0.115***	-0.002	0.105***	0.011
	(9.98)	(-0.09)	(3.98)	(-0.11)	(5.83)	(-0.12)	(5.57)	(0.84)
Observations	286,163	286,163	217,664	217,664	217,664	217,664	420,259	420,259
Adj. R-squared	0.338	0.567	0.292	0.526	0.341	0.555	0.341	0.53
Firm*Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Analyst FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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Table 4, Panel A – First Forecasts

	(1) *Timeliness* Full Sample	(2) *Accuracy* Full Sample
3G Coverage	**0.571*** **	**0.136*** **
	(2.62)	**(2.68)**
Horizon		0.002***
		(6.48)
Effort		0.001
		(0.20)
Firm Experience	0.001	-0.005
	(0.50)	(-0.39)
General Experience	1.735***	-0.343
	(16.37)	(-1.09)
# Covered Firms	-0.000	-0.003**
	(-0.08)	(-2.24)
# Covered Industries	-0.009	-0.006
	(-0.78)	(-0.63)
Broker Size	0.004***	-0.000**
	(7.10)	(-2.15)
Observations	216,404	286,163
Adj. R-squared	0.409	0.727
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Table 4, Panel B – Exclude Analysts in NY

	(1) *Timeliness* Excluding NY	(2) *Accuracy* Excluding NY
3G Coverage	**0.220***	**0.093****
	(1.70)	**(3.13)**
Horizon		-0.002***
		(-3.16)
Effort		-0.001
		(-0.09)
Firm Experience	0.009**	0.001
	(2.12)	(0.14)
General Experience	0.305***	0.157
	(6.10)	(1.23)
# Covered Firms	0.000	0.002
	(0.07)	(1.15)
# Covered Industries	-0.008	0.023
	(-0.56)	(1.32)
Broker Size	0.113***	-0.015
	(3.05)	(-0.87)
Observations	144,949	144,949
Adj. R-squared	0.350	0.567
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Table 4 Panel C Instrumental Variable Regression

	(1) First-Stage *3G Coverage*	(2) Second-Stage *Timeliness*	(3) First-Stage *3G Coverage*	(4) Second-Stage *Accuracy*
3G Coverage		**0.175*** **		**0.219** **
		(3.47)		**(2.51)**
High Lightning*Year	**-0.125*** **		**-0.114*** **	
	(-8.36)		**(-7.65)**	
Effort			0.001**	-0.003***
			(2.01)	(-13.71)
Horizon			-0.044***	0.012
			(-4.42)	(1.63)
Firm Experience	-0.002	0.009***	-0.001	0.001
	(-0.44)	(4.1)	(-0.14)	(0.35)
General Experience	0.140**	0.202***	0.253***	-0.018
	(2.28)	(7.53)	(3.83)	(-0.37)
# Covered Firms	-0.022***	0.008***	-0.020***	0.006
	(-4.31)	(3.28)	(-3.87)	(1.44)
# Covered Industries	0.004	-0.017**	0.002	0.004
	(0.21)	(-1.97)	(0.09)	(0.31)
Broker Size	0.009***	0.001**	0.009***	-0.001
	(11.27)	(2.39)	(11.18)	(-1.54)
Log Population	4,398.399***	-738.144***	2,990.014***	-606.089**
	(111.38)	(-3.39)	(79.91)	(-2.43)
Log County GDP	-33.194***	5.301***	-33.391***	6.414**
	(-61.85)	(3.17)	(-62.37)	(2.2)
Log County Income	43.145***	-7.259***	44.002***	-6.900*
	(63.68)	(-3.31)	(65.07)	(-1.79)
3G Coverage in 2007	-5.697***	0.988***	-5.774***	1.238**
	(-284.12)	(3.4)	(-287.32)	(2.44)
Observations	286,163	286,163	286,163	286,163
Cragg-Donald Wald F statistic		69.83		60.52
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Analysts FE	Yes	Yes	Yes	Yes
County FE	Yes	Yes	Yes	Yes

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Table 5, Panel A - Launch of Bloomberg App

Panel A Launch of Bloomberg App as a Shock		
	(1)	(2)
	Timeliness	*Accuracy*
Treat*Post	**0.170*** **	**0.050** **
	(4.66)	**(2.37)**
Horizon		-0.002***
		(-8.30)
Effort		0.009**
		(2.11)
Firm Experience	0.005**	-0.001
	(2.01)	(-0.18)
General Experience	0.001	-0.004***
	(0.27)	(-7.22)
# Covered Firms	0.000	-0.011**
	(0.17)	(-2.32)
# Covered Industries	-0.006	0.029***
	(-0.59)	(3.38)
Broker Size	0.311***	0.045**
	(3.98)	(2.11)
Observations	123,680	123,680
Adj. R-squared	0.292	0.469
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Table 5, Panel B – Role of Productivity Apps

Panel B Availability of Productivity Apps		
	(1)	(2)
	Timeliness	*Accuracy*
3G Coverage*MoreProdApps	**0.019*** **	**0.096** **
	(5.74)	**(1.97)**
3G Coverage	-0.005	0.126
	(-0.22)	(1.06)
Horizon		-0.002***
		(-5.57)
Effort		-0.006
		(-0.93)
Firm Experience	0.006***	0.013
	(12.30)	(1.21)
General Experience	0.084***	0.372
	(12.15)	(1.00)
# Covered Firms	0.002***	0.004***
	(4.95)	(2.83)
# Covered Industries	-0.002	0.004
	(-1.46)	(0.38)
Broker Size	0.020***	-0.018*
	(6.78)	(-1.87)
Observations	221,300	221,300
Adj. R-squared	0.464	0.587
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Table 5, Panel C – Role of Entertainment Apps

Panel C Availability of Entertainment Apps		
	(1) *Timeliness*	(2) *Accuracy*
3G Coverage*MoreEntertainApps	**-0.032****	**-0.556**
	(-2.20)	**(-1.34)**
3G Coverage	0.022	0.730*
	(0.83)	(1.74)
Horizon		-0.002***
		(-4.53)
Effort		-0.006
		(-0.82)
Firm Experience	0.006***	0.013
	(10.49)	(1.06)
General Experience	0.084***	0.372
	(12.14)	(0.70)
# Covered Firms	0.002***	0.005**
	(4.97)	(2.55)
# Covered Industries	-0.002	0.004
	(-1.46)	(0.38)
Broker Size	0.020***	-0.018*
	(7.24)	(-1.95)
Observations	221,300	221,300
Adj. R-squared	0.464	0.587
Firm*Year FE	Yes	Yes
Analysts FE	Yes	Yes
County FE	Yes	Yes

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Table 6 – Alternative Measure of Timeliness

	(1)
	Timeliness (Average of Indicators)
3G Coverage	**0.028****
	(2.22)
Firm Experience	0.001***
	(6.58)
General Experience	0.025***
	(8.58)
# Covered Firms	0.001***
	(3.42)
# Covered Industries	-0.001
	(-0.85)
Broker Size	0.024***
	(12.38)
Observations	286,163
Adj. R-squared	0.439
Firm*Year FE	Yes
Analysts FE	Yes
County FE	Yes

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Table 7 – Corporate News Events & Distraction Events

	(1) *Revision*	(2) *Revision*	(3) *Revision*
3G Coverage	**0.005*** **	**0.005***	**0.006** **
	(2.64)	**(1.96)**	**(2.11)**
Sports Events		-0.023***	-0.011
		(-13.72)	(-1.47)
3G * Sports Events			**-0.013***
			(-1.73)
Firm Experience	0.001***	0.001***	0.001***
	(13.83)	(13.82)	(13.82)
Gen Experience	0.020***	0.020***	0.020***
	(16.47)	(16.48)	(16.49)
# Covered Firms	0.001***	0.001***	0.001***
	(9.12)	(9.15)	(9.14)
# Covered Industries	0.000	0.000	0.000
	(0.69)	(0.69)	(0.69)
Broker Size	0.005***	0.005***	0.005***
	(8.91)	(8.91)	(8.92)
EA Event	0.464***	0.464***	0.464***
	(35.11)	(35.00)	(35.00)
Observations	1,595,890	1,595,890	1,595,890
Adj. R-squared	0.341	0.341	0.341
Firm*Year FE	Yes	Yes	Yes
Analyst FE	Yes	Yes	Yes
County FE	Yes	Yes	Yes

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Table 8 – After Hour News Events

	(1) *Revision*	(2) *Revision*
3G Coverage	**0.006****	**0.005****
	(2.40)	**(2.09)**
After Hour	-0.013***	-0.032***
	(-4.16)	(-3.30)
3G * After Hours		**0.020****
		(2.00)
Firm Experience	0.001***	0.001***
	(10.77)	(10.76)
Gen Experience	0.020***	0.020***
	(16.14)	(16.14)
Portfolio Size	0.001***	0.001***
	(8.52)	(8.53)
Number of Industries	0.000	0.000
	(0.81)	(0.81)
Broker Size	0.005***	0.005***
	(8.22)	(8.20)
EA Event	0.463***	0.463***
	(35.76)	(35.77)
Observations	1,595,890	1,595,890
Adj. R-squared	0.339	0.339
Firm*Year FE	Yes	Yes
Analyst FE	Yes	Yes
County FE	Yes	Yes

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Table 9, Panel A – The Accuracy of Target Prices

	(1) *TP Accuracy*
3G Coverage	**0.031***
	(1.78)
Firm Experience	-0.001
	(-1.44)
General Experience	-0.024
	(-1.16)
# Covered Firms	0.004*
	(1.74)
# Covered Industries	-0.001
	(-0.10)
Broker Size	0.008
	(1.27)
Observations	836,396
Adj. R-squared	0.711
Firm*Year FE	Yes
Analysts FE	Yes
County FE	Yes

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Table 9, Panel B – Stock Recommendations

Panel B: Recommendations		
	(1) Buy Recommendations *CAR*	(2) Sell Recommendations *CAR*
3G Coverage	**2.225***	**-20.345*****
	(1.69)	**(-2.68)**
Effort	0.039***	-0.019
	(2.81)	(-0.51)
Firm Experience	0.142***	-0.097
	(4.79)	(-0.79)
General Experience	0.263	-0.539
	(0.61)	(-0.32)
# Covered Firms	0.031***	0.024
	(3.89)	(0.86)
# Covered Industries	-0.010	0.011
	(-0.25)	(0.09)
Broker Size	0.106*	-0.126
	(1.88)	(-0.34)
Size	-0.525***	-0.291
	(-4.97)	(-0.42)
M/B Ratio	0.344***	0.904***
	(7.75)	(4.56)
ROA	0.303	2.104
	(0.60)	(0.96)
Std of ROA	0.606	-7.899**
	(0.45)	(-2.39)
Leverage	0.880***	0.424
	(2.93)	(0.29)
Observations	49,042	7,372
Firm FE	Yes	Yes
Year-Month FE	Yes	Yes
Analyst FE	Yes	Yes
County FE	Yes	Yes
Adj. R-squared	0.106	0.293

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Table 10 – Career Outcomes

	(1) *Future All-Star*	(2) *Future Top10 Broker*
3G Coverage	**0.012***	**0.049*****
	(1.68)	**(4.36)**
All-Star	0.380***	0.037***
	(19.36)	(3.46)
Horizon	-0.000***	-0.000***
	(-3.33)	(-3.97)
Effort	0.006***	-0.001
	(5.02)	(-0.95)
Firm Experience	-0.001	0.001
	(-0.61)	(0.68)
General Experience	-0.006	0.005
	(-1.13)	(0.68)
# Covered Firms	0.002***	-0.000
	(4.55)	(-0.60)
# Covered Industries	-0.002*	-0.002
	(-1.82)	(-1.00)
Broker Size	0.011***	0.129***
	(3.43)	(23.27)
NY	0.009	-0.005
	(1.07)	(-0.42)
Top 10 Broker		0.419***
		(28.33)
Observations	23,125	23,125
Adj. R-squared	0.692	0.799
Year FE	Yes	Yes
Broker FE	Yes	Yes

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