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Resource Discoveries and FDI Bonanzas

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Resource discoveries and FDI bonanzas

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Abstract

This paper examines the effect of giant oil and gas discoveries on foreign direct investment in developing economies using a new project-level dataset. We document a large increase in non-extraction FDI in the 2 years following a giant discovery, an event which is unpredictable due to the uncertain nature of exploration. We find that FDI inflows increase by 73% and that this wave is driven by a 37% increase in the number of FDI projects as well as a 22% increases in source countries and a 17% increase in target sectors. We interpret this FDI response as evidence for the news-driven business-cycle hypothesis within a developing country setting and highlight FDI bonanzas as an important development channel for resource rich economies.

JEL CODES: F21, F23, Q32, Q33
Key Words: giant discoveries, news shocks, investment.

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1 INTRODUCTION

The natural-resource price boom of the 2000s and the accompanying discoveries, many of them in sub-Saharan Africa, revived economists interest into the effect of resources on development. A recurrent theme in the literature is that natural resources, notably oil, may be a curse rather than a blessing for developing countries (Sachs and Warner, 2001; van der Ploeg, 2011; Ross, 2012). As Venables (2016) writes in a recent review, developing economies with weak governance have found it hard to use natural resources to improve economic performance. This is often because only the prospect of resource wealth unleashes malign political forces. Indeed oil discoveries have been shown to increase the incidence of internal armed conflict (Lei and Michaels, 2014) and to deteriorate democratic institutions (Tsui, 2011). It is a recent study by Arezki et al. (2015) however that emphasized that discoveries themselves have economic consequences before production starts. This is because giant oil and gas discoveries may act as news shocks, driving the business cycle via investment. This is certainly a channel that needs to be taken into account when analysing the effects of natural resources on economic development.

In this paper we look at the effect of giant oil or gas discoveries on non-extraction foreign direct investment (FDI) into developing economies. There are two main reasons for this focus on FDI. The first is that FDI is a key part of economic development (Hirschman, 1957; De Mello Jr, 1997)[1] and it has proven difficult to stimulate transfers of capital from rich to poor countries Lucas (1990). Hence it is important to understand its determinants. Yet the FDI effects of resources are understudied.[2] The second is that we know little about the effects of news shocks on investment in capital-scarce developing economies where FDI is likely the main source of investment. Given these two reasons and in light of the resource-curse

[1] FDI has been found to be associated with transfers of technology, skills, and pay higher wages (Javorcik, 2015), as well as creating backward and forward linkages with local firms (Javorcik, 2004; Gorg and Strobl, 2001). Moreover a recent report from the International Growth Centre suggests that 50% of biggest export companies in Africa that have successfully industrialised began as FDI ventures (Sutton et al., 2016).

[2] Poelhekke and van der Ploeg (2013) is one notable exception which suggests resource rents crowd out non-resource FDI. We discuss this study further in Section 4.

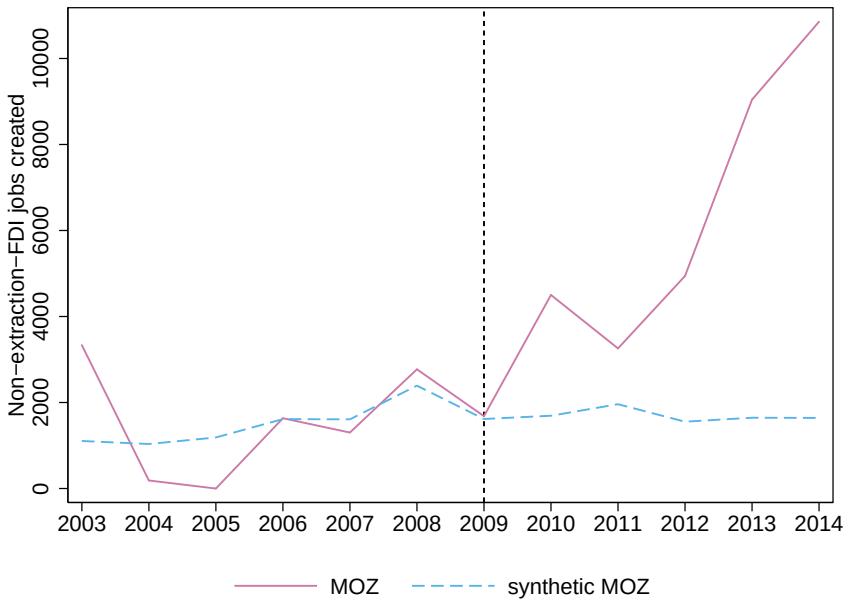
literature we believe it is important to evaluate whether oil and gas discoveries attract or deter FDI in developing countries.

To examine the FDI response to natural resource discoveries we merge data on giant oil and gas discoveries from Horn (2011) with a project-level FDI data set compiled by fDi Intelligence, part of the Financial Times Group. These two data sets are perfectly suited for our study. Firstly, as the timing of giant discoveries is unpredictable due to the uncertain nature of exploration and as it precedes extraction by 5 years on average, it provides a plausibly exogenous news shock (see Arezki et al. (2015)) that allows us to identify the causal effect of resource discoveries on FDI. Secondly, the project-level FDI database allows us to identify FDI flows which are unrelated to the extraction of natural resources. This distinction is particularly important as it allows us to identify the FDI flows driven by "expectations" rather than the investment of oil and gas companies directly related to the giant discovery. It also allows us to decompose the FDI effect into margins, i.e. the number of FDI projects, their average value, the range of source countries and the number of targeted sectors. Hence we are able to distinguish between the effects on the the amount of FDI and on its diversification.

We find that resource discoveries in developing countries cause an FDI bonanza. Lower bound estimates suggest that in the 2 years following a large discovery, non-extraction FDI inflows increase by 73%, the number of FDI projects increases by 37%, the number of sectors and source countries increase by around 20% and the number of jobs created increases by 68%.

Figure 1 provides an illustrative example. It displays the case of Mozambique which announced the first in a series of giant discoveries of natural gas reserves off its coast in 2009. According to Arezki et al. (2015), these discoveries are worth 30 times Mozambique's current GDP (see Figure 2). The fDi Intelligence data suggests that foreign firms moved in right after the first discovery, creating around 10,000 jobs in the following 3 years. A counterfactual analysis suggests that none of this would have happened without the gas discovery. Indeed,

FIGURE 1
The FDI-jobs effect of the Mozambique gas discovery



Note: The *MOZ* line is the estimated number of jobs created by FDI projects, as reported by fDi Intelligence. *Synthetic MOZ* is a synthetic counterfactual, i.e. a weighted average of FDI jobs in non-OECD countries with no discoveries that mimics Mozambique until its first large discovery in 2009.

the number of jobs created by non-extraction FDI in the synthetic control, a weighted average of FDI jobs in non-OECD countries with no discoveries that mimics Mozambique before 2010, remains flat around 1,500 jobs per year.

Our paper is at the intersection of three literatures. Firstly, it contributes to the literature on news shocks in macroeconomics. It suggests that FDI reacts to giant discoveries and can thus be interpreted as evidence for the news-driven business-cycle hypothesis (Beaudry and Portier, 2004; Arezki et al., 2015) within a developing country setting. Secondly, it adds to our understanding of the determinants of FDI not only by highlighting the under-appreciated role of resource discoveries[3] but also by decomposing the FDI flows into extensive and

[3]A recent meta analysis of FDI determinants does not mention resource discoveries (Blonigen and Piger, 2014)

intensive margins to better understand the channels. Thirdly, it contributes to the literature linking natural resources and development by highlighting the role of non-extraction FDI. This is all the more important as, while FDI is rarely discussed in the resource-curse literature, our results suggest discoveries may lead to simultaneous investment in many sectors, possibly providing a window of opportunity for a big push and a growth takeoff (Murphy et al., 1989; Sachs and Warner, 1999).

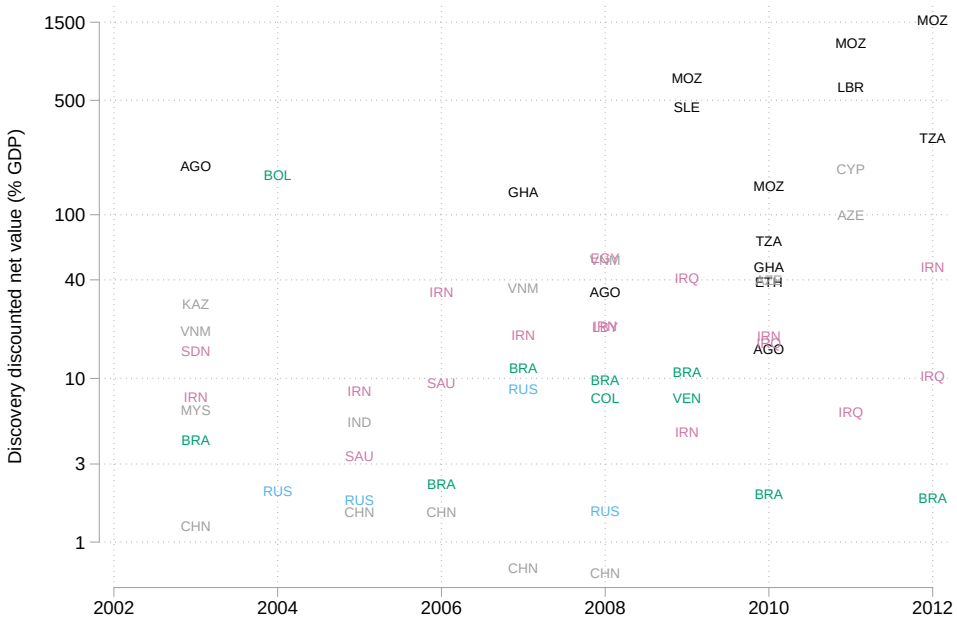
The rest of our paper is structured as follows. In Section 2 we present the data and in Section 3 we discuss our identifications strategy. In Section 4 we present the results and the main robustness checks. We conclude in Section 5.

2 DATA

To examine the FDI response to natural resource discoveries we merge data on giant oil and gas discoveries with a project-level FDI data set. The data on FDI projects is from fDi Intelligence, part of the Financial Times Group. fDi Intelligence has been tracking and verifying individual cross-border greenfield investment projects since 2003 and is now a primary source of data for UNCTAD, the World Bank and the Economist Intelligence Unit. The database provides information on the value of investments and the estimated jobs created.

Importantly, fDI intelligence provides information on the business activity of every project. We use this information to identify FDI flows which are unrelated to the extraction of natural resources. More precisely, we define FDI projects that are not in the "Extraction" Business Activity as *non-extraction FDI*. This distinction is particularly important as it allows us to identify the FDI flows driven by "expectations" rather than the investment of oil and gas companies directly related to the giant discovery. It also allows us to focus on the type of FDI which has been associated with productivity spillovers (Matsuyama, 1992; Gorg and Strobl, 2001) and which may have a higher capacity to create jobs than

FIGURE 2
Discoveries in non-OECD countries (since 2003)



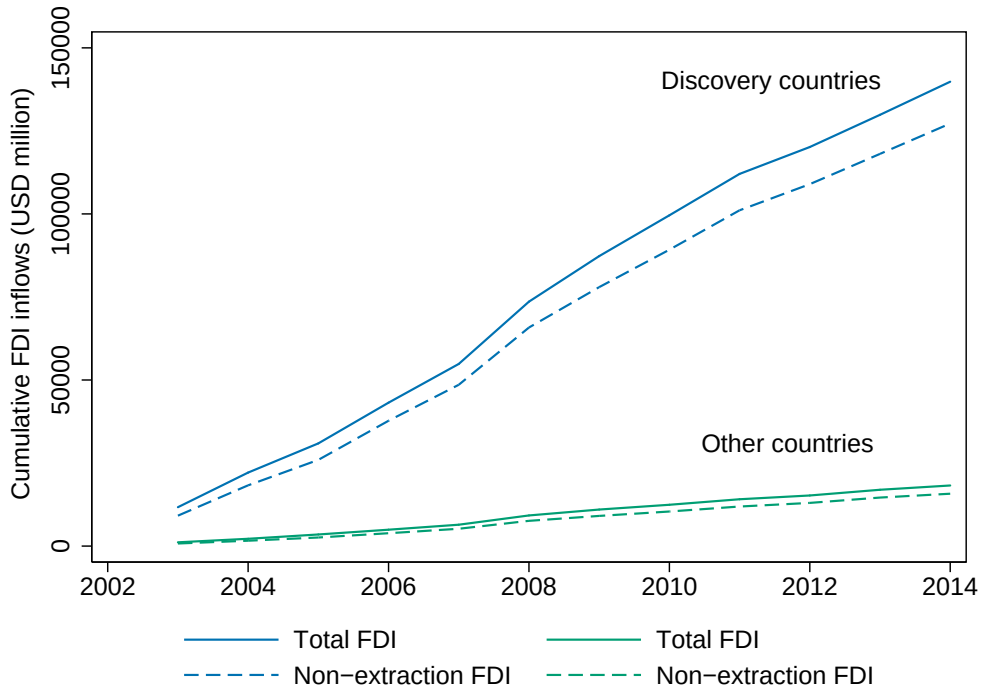
Source: Arezki et al. (2015).

the capital-intensive extraction sector (Ross, 2012). Indeed, the FDI data does suggest non-extraction projects create more jobs on average. While there are large differences in project size across countries, the number of jobs created by non-extraction projects is on average four times larger than in extraction projects.

The data is also a unique and new resource that allows for the analysis to go beyond the country or sector FDI aggregates. Indeed it allows us to decompose FDI into extensive and intensive margins, i.e. the number of projects vs. average value of projects, as well as number of sectors and of source countries.

The data on discoveries are reported by Horn (2011) in *Giant Oil and Gas Fields of the World*. Giant discoveries are defined as fields containing at least 500 million barrels of ultimately recoverable oil equivalent. Figure 2 graphs the net present value of giant oil

FIGURE 3
FDI: Discovery countries vs. other countries



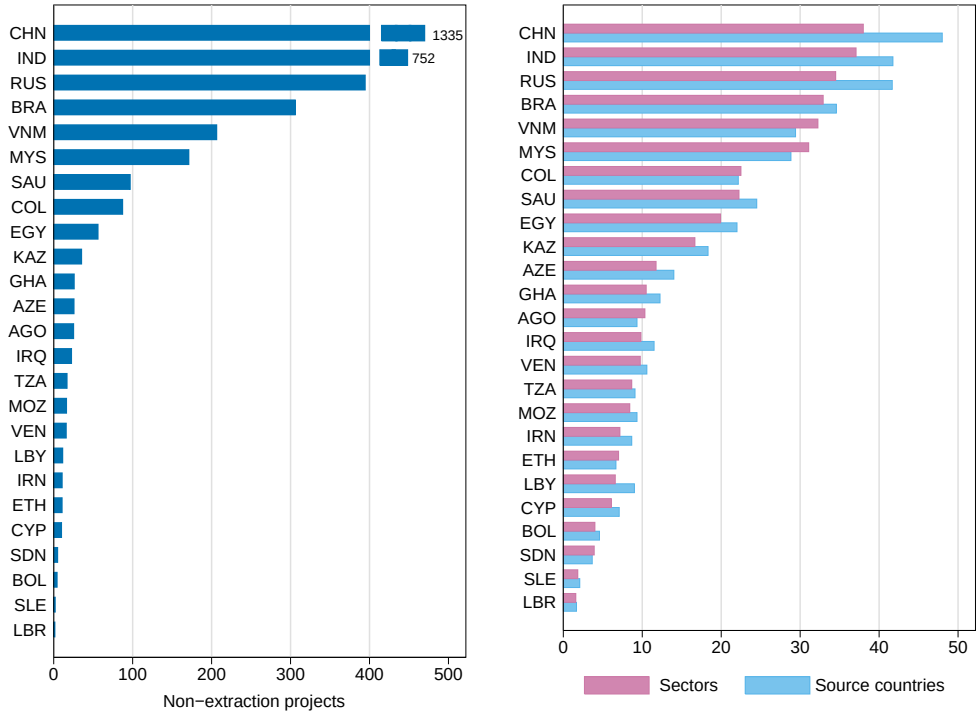
Note: Discovery countries are defined as countries with at least one giant discovery since 2003 (shown in Figure 2).

and gas discoveries as a share of GDP in non-OECD countries since 2003.[4] In total, 74 giant discoveries have been made in 29 countries between 2003 and 2014. Approximately, half of the countries made only one giant discovery in this period such that the remaining 59 discoveries have been made by 14 countries - on average more than 4 discoveries per country. This feature of discoveries - initial discoveries tend to trigger a number of subsequent discoveries - is discussed further below. The average value of discoveries relative to GDP in this period was around 90%.

In Figure 3 we plot the cumulative value of non-extraction FDI and total FDI for countries with giant discoveries and compare it to other countries. We note first that for

[4]Due to FDI data constraints our period of study is 2003-2014. The only OECD countries with giant discoveries in that period are the US and Australia.

FIGURE 4
The extensive margins of FDI in discovery countries



Note: The bars show the average number of projects, source countries and target sectors in discovery countries in the period 2003-2014. There are a total of 39 sectors in the FDI data.

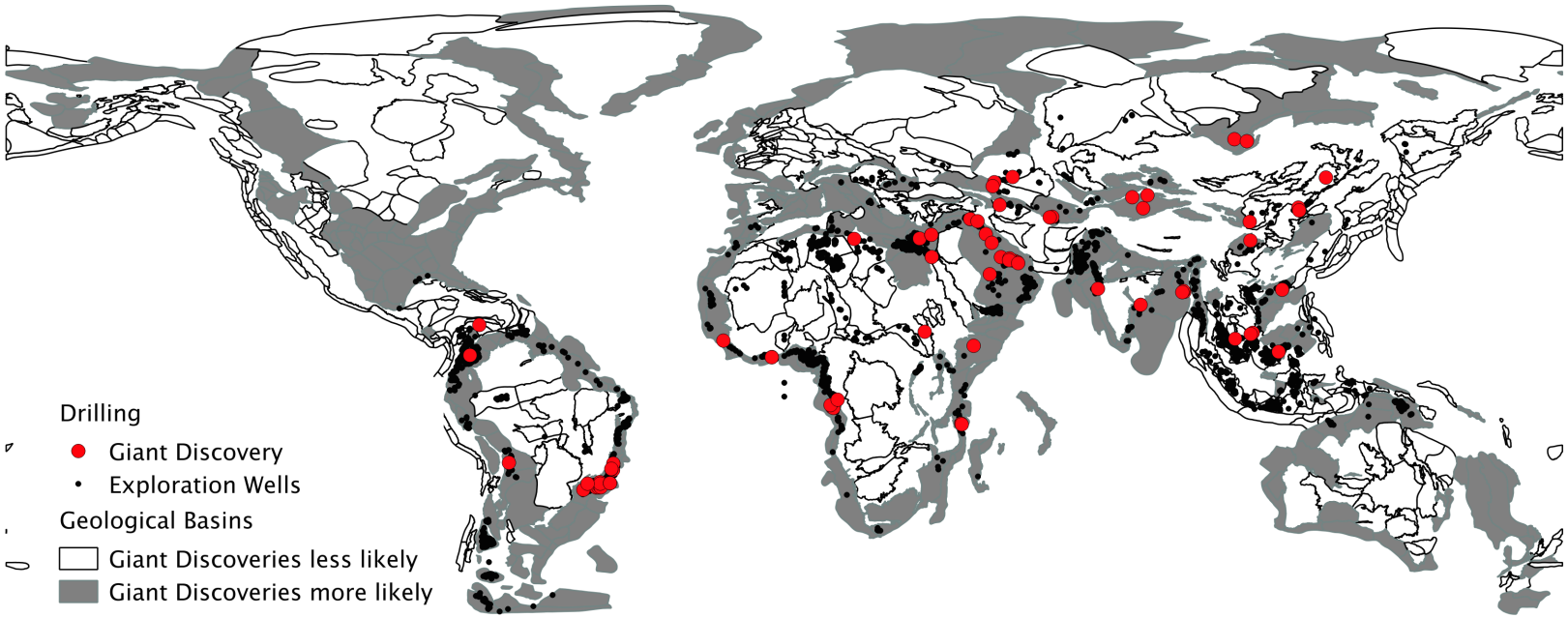
both group of countries non-extraction FDI accounts for the lion's share of FDI. We also note that discovery countries, defined as countries with at least one giant discovery since 2003 (shown in Figure 2) received larger non-extraction FDI flows since 2003 and these have been growing faster. While discovery countries include large countries such as China and India these do not drive the large difference in FDI inflows between the country groups.

In Figure 4 we summarize the number of FDI projects, source countries and target sectors in discovery countries. China and India received more than 500 FDI projects per year during 2003-2014 while smaller countries such as Colombia and Egypt received between 50 and 100 projects. The right panel shows that larger countries receive FDI from a larger number of countries and in more sectors. For example, Brazil and Vietnam received FDI from around 30 source countries and in 30 target sectors out of 39 possible sectors. In the next section we describe how we identify the causal effect of discoveries on these FDI inflows.

3 EMPIRICAL STRATEGY

Our identification strategy relies on the unpredictability of giant discoveries. As we detail in this section, the uncertain nature of exploration creates a source of plausibly exogenous variation that allows us to estimate the causal effect of giant oil and gas discoveries. We thus use a simple difference-in-differences model to compare FDI flows in the year of a giant discovery and in the two following years to FDI in other years. Hence, the timing of a discovery is at the core of our identification strategy.

FIGURE 5
Basins, drilling, and giant discoveries in non-OECD countries (since 2003)



Note: Black dots are exploration wells (Source: Horn (2011)), red dots giant discoveries (Source: Wood Mackenzie (2015)). Grey indicate basins were exploration drilling is particularly likely to result in giant discoveries. (Source: Shapefile has been constructed by Robertson CGG (2016) while Mann et al. (2001) provide an analysis on which type of basin is particularly likely to result in a giant discovery. Drilling activity and giant discoveries in OECD countries is excluded from the Figure.

Previous studies such as Arezki et al. (2015), Tsui (2011), and Lei and Michaels (2014) have suggested that the timing of giant oil discoveries is plausibly exogenous and unpredictable due to the uncertain nature of exploration.[5] To examine this claim further we matched the discovery data with data on exploration wells from Wood Mackenzie (2015) and geological basins from Robertson CGG (2016) for all non-OECD countries. This data is mapped in Figure 5. Grey areas indicate basins where exploration drilling has been particularly likely to result in giant discoveries (Mann et al., 2001). It clearly shows that companies have not made large discoveries everywhere they have drilled exploration wells.

Oil and gas companies are always searching for a particularly large, and preferably giant, discovery. This is because fixed costs represent a very large share of total costs in developing and operating a successful well (Adelman, 1962). Thus, exploration wells drilled tend to cluster in areas which are considered to be particularly productive (see Figure 5). While the data suggests that the probability of a giant discovery conditional on exploration drilling is around 2%, there is no deterministic relationship between exploration and discovery. Exploring for 100 years does not guarantee a giant discovery. This has already been emphasized by Adelman (1962): "There is no amount of chronological time which can be said to correspond to the exploration long run." For example, South Africa has been digging exploration wells since 1968 but has still haven't found a giant field. The Financial Times also provides a telling example of the uncertain nature of the timing of discoveries (Kavanagh, 2013). In 2010 Lundin Petroleum made the largest discovery of the year and one of the biggest ever in Norway. It was found three meters away from where Elf Aquitaine drilled but failed to find oil in 1971.

To evaluate the effect of giant discoveries on FDI flows we estimate the following specification:

$$(1) \quad FDI_{it} = \beta D_{it} + \alpha_i + \sigma_t + \epsilon_{it}$$

[5] Similarly Cotet and Tsui (2013) and Cavalcanti et al. (2015) suggested that *luck* in exploration is random and allows for the causal identification of oil discoveries.

where FDI_{it} is a placeholder for different measures of FDI inflows in country i in year t such as the total value of FDI inflows, the number of FDI projects, the number of jobs created, the number of source countries and of target sectors. To include observations where there is no FDI and thus include zeros we use an inverse hyperbolic sine transformation instead of the log transformation (Burbidge et al., 1988; MacKinnon and Magee, 1990). D_{it} is a dummy equal to 1 in the year of the discovery and the two subsequent years. The coefficient of interest is β. α_i is a country fixed effect that picks up factors that do not vary over time within countries such as geography as well as variables which vary little year-on-year such as institutions or market potential. And σ_t is a year fixed effect that controls for global factors such as the oil price. ϵ_{it} represents the error term which we allow to correlate arbitrarily across years within a country and across countries within a year. In alternative specifications we limit the country sample to countries with at least one exploration well, i.e. *exploration countries*, and to countries with at least one giant discovery during 2003-2014, i.e. *discovery countries*. These alternative country samples provide a more conservative counterfactual in the event exploration is endogenous.

4 RESULTS

Our main results are presented in Tables 1 and 2. The Tables provide estimates of β (see equation 1) for seven different measures of FDI in three panels based on three different country samples. The sample in Panel A includes all non-OECD countries, while Panel B includes only *exploration countries* and Panel C only *discovery countries*.

We find that non-extraction FDI inflows are 73% higher in the 2 years following a giant discovery. This is the lower bound estimate from Panel C, yet there is no significant difference in estimates across panels which suggest that the choice of counterfactual does not affect our main result. We also find that the number of FDI projects increases by 37% and the number of jobs created by 68%, while the average size of projects is not significantly affected.

Table 1: Non-extraction FDI

Panel A: All countries

	(1) FDI (USD million)	(2) Nb projects	(3) Avg project size	(4) Jobs created
Discovery in past 2 years	0.616**	0.300**	0.341	0.571*
	(0.263)	(0.123)	(0.217)	(0.261)
N	1992	1992	1992	1992
R-sq	0.75	0.91	0.48	0.75

Panel B: Only exploration countries

	(1) FDI (USD million)	(2) Nb projects	(3) Avg project size	(4) Jobs created
Discovery in past 2 years	0.594**	0.303**	0.314	0.549*
	(0.264)	(0.126)	(0.211)	(0.251)
N	1080	1080	1080	1080
R-sq	0.72	0.90	0.41	0.75

Panel C: Only discovery countries

	(1) FDI (USD million)	(2) Nb projects	(3) Avg project size	(4) Jobs created
Discovery in past 2 years	0.551*	0.318**	0.245	0.519*
	(0.286)	(0.140)	(0.219)	(0.267)
N	300	300	300	300
R-sq	0.73	0.90	0.37	0.75

Country and year fixed effects included in all regressions. Standard errors in parenthesis clustered by country and year, and * stands for statistical significance at the 10% level, ** at the 5% level and *** at the 1% percent level. Non-dummy variables are in inverse-hyperbolic sines.

This suggests that the FDI effect is driven by the extensive margin rather than the intensive margin. Results in Table 2 further confirm that the extensive margin plays a key role in the response of FDI flows to giant discoveries. We find that the number of FDI sectors and source countries increases by 20% in the 2 years following a giant discovery. These results are again very similar across panels.

The results suggest that giant discoveries indeed attract non-extraction FDI. The FDI inflows occur several years *before* production actually starts - on average 5 years following a discovery - and, thus, precede the potential oil boom. As discussed above non-extraction FDI tends to be labor intensive and, thus, giant discoveries have indirectly the potential

Table 2: Extensive margins

Panel A: All countries

	(1) Nb source countries	(2) Nb sub-sectors	(3) Nb sectors
Discovery in past 2 years	0.204**	0.251**	0.192**
	(0.076)	(0.082)	(0.069)
N	1992	1992	1992
R-sq	0.87	0.90	0.87

Panel B: Only exploration countries

	(1) Nb source countries	(2) Nb sub-sectors	(3) Nb sectors
Discovery in past 2 years	0.188**	0.193*	0.158**
	(0.078)	(0.088)	(0.071)
N	1080	1080	1080
R-sq	0.86	0.89	0.86

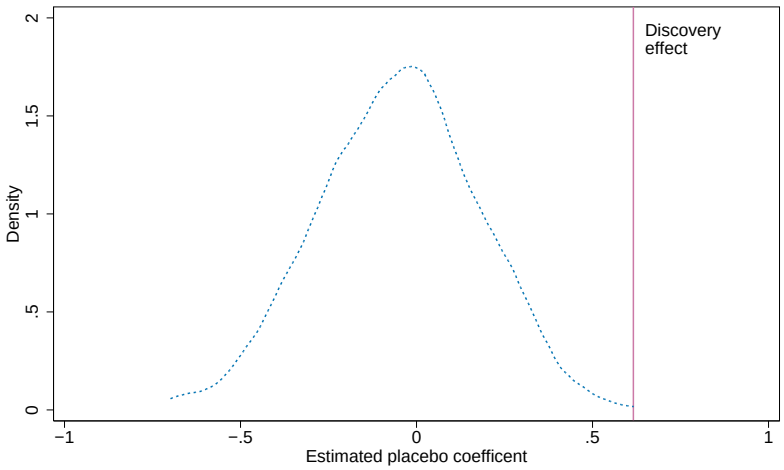
Panel C: Only discovery countries

	(1) Nb source countries	(2) Nb sub-sectors	(3) Nb sectors
Discovery in past 2 years	0.197*	0.246**	0.189**
	(0.090)	(0.095)	(0.080)
N	300	300	300
R-sq	0.81	0.88	0.82

Country and year fixed effects included in all regressions. Standard errors in parenthesis clustered by country and year, and * stands for statistical significance at the 10% level, ** at the 5% level and *** at the 1% percent level. Non-dummy variables are in inverse-hyperbolic sines.

to create formal jobs. Also, this influx of FDI is driven by the extensive rather than intensive margin such that it provides a source of diversification for the economy as jobs are created across a variety of sectors. The increase in the number of source countries is also consistent with the idea that giant discoveries act as news shocks about future market potential propagated across countries. Hence, giant discoveries may work as a coordination device which exogenously determine the timing of investment from different countries and sectors thereby providing a window of opportunity for a big push.

FIGURE 6
Distribution of 500 placebo discovery effects



Note: The 500 placebo discoveries were generated by reshuffling randomly the discovery years within countries across years. Their effects on non-extraction FDI were estimated using our baseline specification in equation 1. The vertical red line gives our benchmark estimate (column 1 of Table 1).

Our results are in line with Arezki et al. (2015) who show that in a panel of up to 180 countries during the period 1970-2012 that investment rises robustly right after the news of a giant discovery arrives. And while our results seem to go against Poelhekke and van der Ploeg (2013) it is worth noting that the latter showed that resource rents, rather than discoveries, crowded out non-resource FDI, and that was focusing on the period 1985-2002, i.e. before the latest boom. Our results are thus complementary rather than contradicting.

Robustness In the next paragraphs we describe a battery of robustness checks to reinforce our main result. Our first check is a falsification exercise to highlight the importance of the timing of the discoveries across years. In this check we generated placebo discoveries by reshuffling the discovery years randomly within discovery countries across years and used this "false" data to re-estimate equation 1 five hundred times on our Panel A sample. As we show in Figure 6, reshuffling the discoveries randomly does not give similar results. Indeed,

Table 3: Robustness to UNCTAD data and longer time period

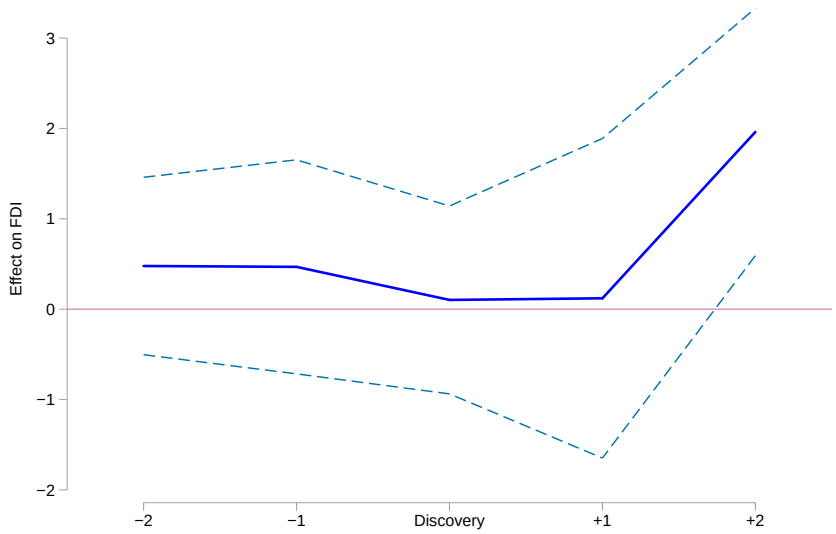
Period 1970-2014			
	(1)	(2)	(3)
	FDI	FDI	FDI
Discovery in past 2 years	0.484**	0.486**	0.434**
	(0.185)	(0.185)	(0.166)
N	8731	7523	6527
R-sq	0.73	0.74	0.75
Sample countries	Non-OECD	Exploration	Discovery
Period 2003-2014			
	(1)	(2)	(3)
	FDI	FDI	FDI
Discovery in past 2 years	0.488	0.460	0.525
	(0.301)	(0.299)	(0.307)
N	1992	1080	300
R-sq	0.81	0.74	0.65
Sample countries	Non-OECD	Exploration	Discovery

FDI is from UNCTAD and is in current USD. Country and year fixed effects included in all regressions. Robust standard errors in parenthesis, and * stands for statistical significance at the 10% level, ** at the 5% level and *** at the 1% percent level.

the distribution of 500 randomized discoveries is centred around zero, and only 19 random draws out of 500 came out positive and significant. And based on the standard error of the placebo distribution, the probability of obtaining our benchmark estimate of 0.616, as shown by the vertical line, is below 0.01. This adds confidence in our identification based on the exogenous timing of the discoveries.

Our second robustness check is to re-estimate equation 1 using FDI data from UNCTAD rather than from fDi Intelligence. While UNCTAD is the most commonly used source of FDI across countries, it does not allow us to isolate non-extraction FDI nor to disaggregate FDI into margins. It does however allow us to expand the sample period to 1970-2014. Results in

FIGURE 7

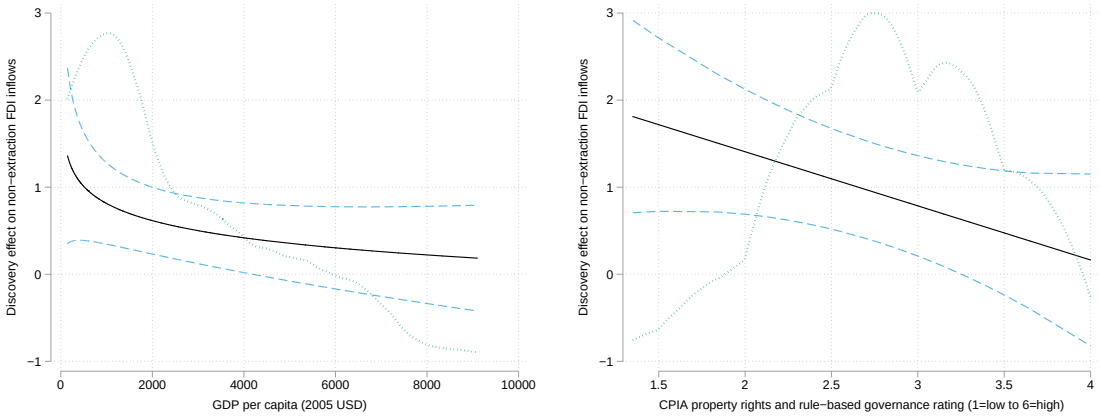


Note: The yearly effects on non-extraction FDI are estimated in a specification akin to our baseline (Table 1) where the 2-year discovery dummy is replaced with five dummies, one for each year from 2 years before to 2 years after the discovery.

Table 3 confirm our baseline. We find that, again irrespective of the counterfactual sample of countries, discoveries lead to a 55% increase in Total FDI. We find similar results if we constrain the data to our main study period (2003-2014) even though the standard errors become larger.

In a third robustness check we restrain our sample to the years before and the 3 years after the *first* giant discovery in each country in our sample. By eliminating subsequent giant discoveries from our sample we can estimate a more flexible specification which allows us to explore the dynamics of the response in non-extraction FDI in more detail while avoiding potential biases introduced by successive discoveries. We thus estimate equation 1 but we replace D_{it} with 5 dummies (two lags, two leads and one dummy for the year of the discovery). The results of this specification are presented in Figure 7. We find a positive effect on non-extraction FDI only two years after the discovery. On the other hand, we do not find any evidence of high non-extraction FDI flows in the years preceding a discovery.

FIGURE 8
Heterogeneity of the FDI effects across countries



Note: Specification of Table 1 where the discovery dummy is interacted with the x-axis variable. The data on GDP per capita and on institutional qulaity is form the World Bank Development indicators.

In additional robustness checks we show that our results also hold when we include the number of previous discoveries as an additional control in equation 1 as in Arezki et al. (2015) or when we estimate a Poisson pseudo-maximum likelihood (Silva and Tenreyro, 2006) instead of a linear model (results available upon request).

Heterogeneity To examine further the effect of giant discoveries on FDI we first looked at how it varies across destination countries based on their level of development and their institutional quality. To do so we augmented equation 1 by interacting the discovery dummy with GDP per capita and with a measure of institutional quality, i.e. the CPIA property rights and rulebased governance rating. The results are shown in Figure 8. We find the effect to be stronger and statistically significant only in poorer countries with bad institutions. This suggests that it is in those countries that a giant discovery is a bigger deal.

We then examine if the FDI effect varies across source country groups, i.e. from OECD versus non-OECD countries, and from risk loving versus risk avoiding countries (proxied by the Uncertainty Avoidance Index, see footnote of Table 4 for details on this classification).

Table 4: Source countries

Panel A: All countries

	(1) OECD	(2) Non-OECD	(3) Risk-avoiding	(4) Risk-loving
Discovery in past 2 years	0.260	0.837***	0.192	0.785***
	(0.184)	(0.231)	(0.191)	(0.128)
N	1992	1992	1992	1992
R-sq	0.75	0.71	0.73	0.71

Panel B: Only exploration countries

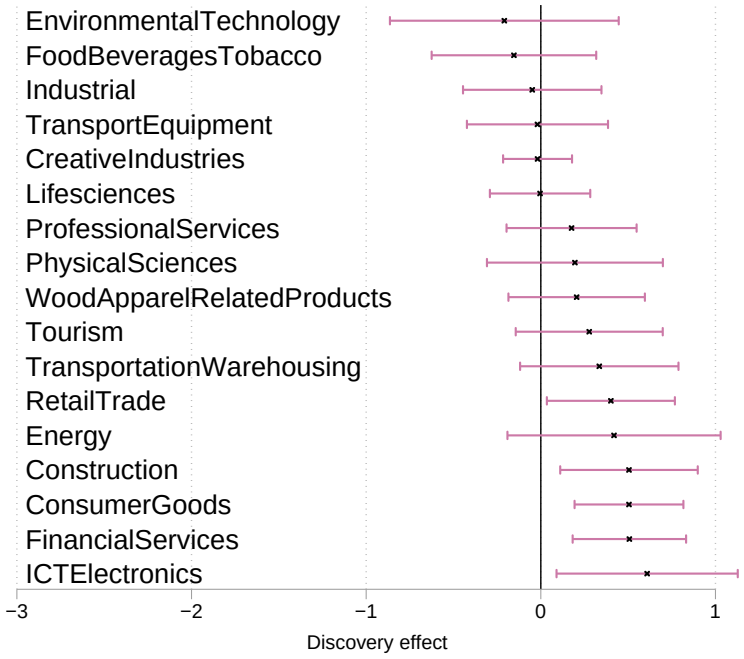
	(1) OECD	(2) Non-OECD	(3) Risk-avoiding	(4) Risk-loving
Discovery in past 2 years	0.186	0.809***	0.152	0.732***
	(0.198)	(0.239)	(0.177)	(0.144)
N	1080	1080	1080	1080
R-sq	0.73	0.65	0.67	0.69

Panel C: Only discovery countries

	(1) OECD	(2) Non-OECD	(3) Risk-avoiding	(4) Risk-loving
Discovery in past 2 years	0.152	0.794**	0.091	0.749***
	(0.228)	(0.282)	(0.233)	(0.166)
N	300	300	300	300
R-sq	0.73	0.63	0.68	0.66

Note: Left-hand side variable is non-extraction FDI (USD million) from the title country group. Country and year fixed effects included in all regressions. Standard errors in parenthesis clustered by country and year, and * stands for statistical significance at the 10% level, ** at the 5% level and *** at the 1% percent level. Non-dummy variables are in inverse-hyperbolic sines. Risk preference groups are based on the Uncertainty Avoidance Index from the Hofstede Centre. Countries exhibiting strong UAI (>=50) maintain rigid codes of belief and behaviour and are intolerant of unorthodox behaviour and ideas. Weak UAI societies (<50) maintain a more relaxed attitude in which practice counts more than principles.

FIGURE 9
Discovery effect on FDI by cluster



Note: The bars show β coefficients estimated running regression 1 by cluster. Clusters are a level of aggregation above sectors in fDi Intelligence industry classification system.

As above the results in the first panel are based on the complete sample which contains all countries, while we constrain the sample in panel B and C to countries with exploration or with giant discoveries. The results in columns 1 and 2 of Table 4 suggest that the FDI response to giant discoveries is largely driven by FDI from non-OECD countries, and hence not from the countries of Big Oil companies such as BP, Chevron, ExxonMobil, Shell, Total, Eni and ConocoPhillips. The results in column 3 and column 4 imply that the FDI response to giant discoveries is largely driven by risk loving countries. Thus, both results are in line with the FDI response being driven by expectations of future market potential and a brighter future which propagate across countries rather than strong current fundamentals.

Finally we explore the FDI response across clusters by re-estimating equation 1 by cluster (we opted for clusters rather than sectors as these aggregate FDI projects into 19 categories

rather than 39 and thus ease the presentation of the results). The results in Figure 9 suggest that the strongest response comes from the information and communication technology and electronics cluster, followed by FDI in financial services, consumer goods, construction and retail trade. FDI in other clusters does not seem to respond significantly to giant discoveries. Note that some of those sectors, in particular construction and retail trade are known to be labour intensive and provide the potential for the creation of many jobs in developing countries. Moreover, the effect on financial services might be linked to the deepening of retail banking as well as corporate banking and thus ease financial constraints which are frequently considered a strong impediment to development.

5 CONCLUSION

In this paper we have shown that giant oil and gas discoveries lead to FDI bonanzas. More precisely, FDI in non-extractive sectors increases by 73% in the 2 years following a giant discovery. This result is driven by the extensive margin, i.e. by new projects, in new sectors, from new source countries and thus provides evidence in support of the news-driven business-cycle hypothesis which was recently formalised by Beaudry and Portier (2004) but goes back to Pigou (1927) who wrote that *the varying expectations of business men... constitute... the immediate cause and direct causes or antecedents of economic fluctuations.* Giant oil and gas discoveries could thus have gold-rush type effects where expectations of future wealth drive an influx of diversified investment which could provide an opportunity for a big push and a growth takeoff (Murphy et al., 1989). Whether the FDI bonanzas are harnessed for development is a question left for future research.

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