

**DETERMINANTS OF FDI LOCATION IN EGYPT:
EMPIRICAL ANALYSIS
USING GOVERNORATE PANEL DATA**

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Abstract

We empirically analyze the determinants of inward foreign direct investment (FDI) in Egypt employing a novel panel dataset of 26 Egyptian governorates for the period 1992–2008. Using the case of Arab FDI to Egypt, we also investigate whether FDI location determinants are different depending on the similarity of culture and language between FDI source and host region. Our results indicate that domestic private investment, well-functioning Free Zones, and labor abundance positively affect FDI location. In contrast to results from other countries, we do not find a significant effect of concentration of previous FDI stocks on the location of inward FDI. Moreover, regional investment preferential policies in Egypt—with the exception of Free Zones—do not affect the unequal spatial FDI distribution. Finally, we find that the location of Arab FDI inflows to Egypt is not sensitive to the usual determinants. Arab investors are more willing to invest in less investment-agglomerated areas and less affected by economic considerations and incentives.

JEL Classifications: F21, E22, R12, O53, Z10

Keywords: Foreign Direct Investment; FDI location; agglomeration; cultural similarity; regional FDI; Arab countries.

ملخص

نقوم بتحليل محددات الاستثمار الأجنبي المباشر الداخل (FDI) تجريبيا في مصر ونستخدم مجموعة بيانات تتبعية جديدة من 26 محافظة مصرية للفترة 1992-2008. باستخدام حالة الاستثمار الأجنبي المباشر العربي لمصر، نقوم أيضا بالتحقيق في ما إذا كانت المواقع المختلفة لمحددات الاستثمار الأجنبي المباشر تختلف اعتمادا على التشابه في الثقافة واللغة بين مصدر الاستثمار الأجنبي المباشر والمنطقة المضيفة. نتأجنا تشير إلى أن الاستثمار الخاص المحلي والمناطق الحرة جيدة الأداء، ووفرة اليد العاملة يؤثر إيجابا على موقع الاستثمار الأجنبي المباشر. وعلى النقيض من النتائج من بلدان أخرى، لا نجد له أثر كبير في تركيز أسهم الاستثمار الأجنبي المباشر السابق على موقع للاستثمار الأجنبي المباشر الداخل. وعلاوة على ذلك، فإن السياسات التفضيلية للاستثمار الإقليمي في مصر— باستثناء المناطق الحرة— لا تؤثر على التوزيع غير المتكافئ للاستثمار الأجنبي المباشر المكاني. وأخيرا، نجد أن موقع تدفقات الاستثمار الأجنبي المباشر إلى مصر العربية ليست حساسة للمحددات المعتادة. نجد أن المستثمرون العرب هم أكثر استعدادا للاستثمار في المناطق ذات الاستثمارات الأقل تكتلا وأقل تأثرا لاعتبارات الحوافز الاقتصادية.

1. Introduction

The share of developing countries in worldwide Foreign Direct Investment (FDI) inflows is significantly increasing. Since 2012, developing countries received more FDI inflows compared to developed economies (UNCTAD 2013,2014a). On an annual basis, Egypt has received either the largest or the second largest amount of FDI in Africa since 2004 (excluding the year 2011, where the 25th of January Uprising deterred FDI in Egypt). Among Arab countries, Egypt received the third largest amount of FDI in this time period, after Saudi Arabia and the United Arab Emirates (UNCTAD 2014b). FDI is a major contributor to capital accumulation in the Egyptian economy. During the period 2004-2010, FDI inflows constitute an average of 30% of Egyptian gross fixed capital formation. This is much higher than the average in North Africa (15%), Arab countries (19%), Africa (16%), developing countries (12%) and worldwide (11%).¹ In spite of its importance, empirical research on FDI in Egypt is still rather limited (UNCTAD 2014b).²

FDI exhibits a highly uneven distribution across regions in Egypt (Hanafy 2014). While Egypt consists of 27 governorates, roughly 90% of Greenfield FDI has been directed to ten governorates only, with the governorates Cairo and Giza together attracting about two-thirds of it. These stylized facts indicate that some governorates have big advantages in terms of FDI attractiveness compared to others. In this paper, we ask the following two questions: First, what factors determine the location of FDI inflows in Egypt in a statistically significant and economically relevant way? And second, do these factors also explain the spatial distribution of FDI from other Arab countries, that is, FDI under cultural and language commonality between the FDI source and recipient country?

To answer these questions, we use a novel panel dataset of 26 governorates in Egypt for the period 1992–2008, exploring the role played by different potential determinants of FDI spatial distribution across Egypt. Specifically, and based on findings of previous literature, we investigate the impact of agglomeration and market variables, labor market variables as well as regional investment policy variables.

This paper contributes to the existing literature in several aspects. First, to the best of our knowledge, no empirical study has been conducted so far to identify the location determinants of FDI in Egypt. A considerable body of literature explored the location of foreign investors within different developed and developing countries, for example for the United States by Coughlin et al. (1991), Friedman et al. (1992), Head et al. (1994, 1995, 1999), Bobonis and Shatz (2007), Halvorsen (2012); for China by Head and Ries (1996), Broadman and Sun (1997), Cheng and Kwan (2000), Coughlin and Segev (2000), He (2002), Sun et al. (2002); and more recently India by Nunnenkamp and Stracke (2008), Mukim and Nunnenkamp (2012), among others. Their results show how FDI location determinants could differ between different countries and samples. Accordingly, our analysis allows us to assess, whether FDI location determinants in Egypt differ from literature findings on other countries. Our results are of direct relevance for policymakers.

Second, the paper uses a novel panel dataset on Egyptian governorates, which has been collected and consolidated by the author from various data sources and, to the best of our

¹ This is the annual average before the Egyptian Uprising, in line with the time focus of our analysis. When including recent years, the average contribution of FDI inflows to gross fixed capital formation in Egypt is 23% in 2004-2013. This is again higher than North Africa (12%), Arab countries (16%), Africa (15%), developing countries (11%) and worldwide (10%) (UNCTAD 2014b).

² Louis et al. (2003) conducted a survey on FDI in Egypt. Massoud (2008) studies the effect of FDI on economic growth using national level data. Also at the national level, Kamaly (2004) analyses the determinants of FDI in Egypt for the period 1986-2001, finding a very weak persistence of FDI flows, a positive effect of economic growth and openness, as well as a negative effect of nominal exchange rate and international interest rate.

knowledge, has not been used for econometric research before. In fact, we are not aware of any econometric study that uses a panel dataset at the governorate level in Egypt. Presumably, this is due to the difficulties of collecting economic data in Egypt.

Third, the paper contributes to the strand of literature on the role of culture and language as potential FDI determinants. In a recent paper, Méon and Sekkat (2013) demonstrate how formal and informal institutions interact in determining FDI. The authors particularly highlight the importance of this interaction for MENA countries. Guiso et al. (2009) show that bilateral trust, which is affected by cultural relationships, enhances bilateral FDI. Analysing the role of culture in the case of Asian FDI, Gao (2003) shows the significant importance of ethnic Chinese networks. The relevance of cultural similarity for FDI in the case of Arab countries has been tackled by two studies so far. First, Roberts and Almahmood (2009) find a significant effect of cultural similarity when investigating FDI to Saudi Arabia. Second, Sekkat (2014) uses a panel of FDI in 13 Arab countries from 1995-2009 to compare determinants of intra-Arab FDI with FDI from non-Arab countries. Sekkat (2014) shows that determinants of FDI inflows to Arab countries vary depending on its source from Arab versus non-Arab countries and that intra-Arab FDI is higher than can be deduced from empirical models, suggesting cultural similarity as well as regional strategic considerations as explanation for these phenomena.

Our contribution to this body of literature comes from focusing on FDI location determinants *within* the same host country. Using the case of Arab FDI to Egypt, our data allows us to investigate whether these determinants are different depending on the similarity of culture and language between the FDI source and recipient country. Specifically, we distinguish between location determinants of Arab versus non-Arab FDI to Egypt, which is the largest recipient of intra-Arab FDI (Bolbol and Fatheldin 2006). Arab investors share the Arabic language and have a lower cultural distance to the host Egypt, which facilitates communication, access to information and networking. On the contrary, non-Arab investors in Egypt are exposed to higher information asymmetries and information costs. Therefore, we expect non-Arab investors to more likely to follow the location choices of previous investors.³

The results of this paper allow first insights into the location choice behaviour of foreign investors in Egypt. We find that domestic private investment, well functioning Free Zones, as well as labor abundance positively determine the distribution of FDI inflows in Egypt on the governorate level. In contrast to results from other countries, we do not find a significant effect of previous FDI, which suggests no self-reinforcing effect of FDI. Further, while we do find a positive effect of labor quantity, we do not find any significant effect of labor education on FDI location. Our results further show that a number of regional policies in Egypt—with the exception of Free Zones—do not affect the unequal FDI distribution in the country.

Finally, our analysis reveals substantial differences between the location determinants of Arab versus non-Arab FDI in Egypt. The differences are robust to restricting the analysis to one FDI sector only. Our results suggest that regional investors from other Arab countries—who share the Arabic language and have a lower cultural distance with Egypt—are more willing to invest in less investment-agglomerated areas, compared to non-Arab investors, which is in line with our hypothesis. However, our findings seem to go one step further, as we do not find any effect of agglomeration economies or incentive reactions by Arab FDI at all. In fact, Arab FDI location does not seem to be affected by any of the usual determinates. As similarly argued by Bolbol and Fatheldin (2006) and Sekkat (2014) for intra-Arab FDI, our finding seems to

³ Du et al. (2012) similarly analyses the effect of cultural proximity between China and its FDI source countries on FDI location within China, however, with a different focus than ours. Du et al. (2012) investigate how cultural proximity affects the impact of regional institutional quality—where variations are pronounced in China—on FDI location choice. They show that a higher cultural difference induces a stronger aversion to invest in regions with weaker economic institutions.

suggest that regional strategic and political considerations, rather than economic considerations, are of higher relevance for the location Arab FDI.

The paper is structured as follows. Section 2 introduces a short review of FDI in Egypt. Section 3 reviews the related literature and introduces our hypotheses on the determinants of FDI location. Section 4 introduces the empirical model and the data, while the results are reported and discussed in section 5. Section 6 concludes.

2. FDI in Egypt: Data, Distribution and Policies

2.1 Data and patterns

In this paper, we only provide a brief overview of FDI in Egypt, which is described thoroughly by Hanafy (2014). The data is based on registered investments by foreign firms, registered at the General Authority for Investment and Free Zones (GAFI), which is the principal governmental authority in charge of licensing, registering, regulating and promoting foreign and domestic investment projects in Egypt. This is because FDI data by the Central Bank of Egypt (CBE) is not reported on the governorate level. The data by the GAFI excludes foreign investments into the petroleum sector, as well as privatization proceeds (Hanafy 2014). It rather focuses on Greenfield FDI and company expansions. This data focus is even better in the case of our research question, as it seems reasonable to focus on investment types and modes, in which investors are rather flexible in their location choice. While Greenfield plants clearly require an explicit decision about the investment location (Guimaraes et al. 2000), acquisition or resource seeking FDI may not. The resource-seeking FDI in the oil and gas sector is by default strongly restricted regarding its geographical flexibility within the country and is expected to be located near the natural resource. Acquisitions based on privatisation procedures are also geographically restricted by the location of the public company to be privatised. Our focus on Greenfield FDI is consistent with similar literature (e.g. Cheng and Kwan 2000; Guimaraes et al.2000). ‘FDI’ is often used in this paper, where ‘non-petroleum Greenfield FDI’ is specifically meant for reasons of simplicity.

While Hanafy (2014) thoroughly describes FDI data in Egypt since the open door policy in the 1970s, we briefly focus here on the time period of our model analysis in this paper, which is restricted by the availability of other variables, as described in section 4. Figure 1 shows the flow of real non-petroleum Greenfield FDI to Egypt for the period 1992-2008 in billions of EGP at constant 1992 prices. FDI in Egypt surged in the mid 2000s, reaching an unprecedented level of 13.3 billion EGP in 2007.⁴ The surge of FDI in this time period may be mainly attributed to the increase in global and regional liquidity, as well as the substantial reforms that have been undertaken by the—back then new—government in Egypt to improve the investment climate and encourage domestic and foreign investments (Ismail.2010). For example, a new investment facilitation law has been introduced in 2004 (Law no. 14/2004), making the GAFI the sole body that investors need to address in order to establish their companies, which significantly decreased the level of bureaucracy that investors face. GAFI records indicate that the average amount of time it took to register a company significantly dropped after the establishment of the so called ‘One-Stop Shop’ from an average of 34 days (and up to 140 days) to three days only. Accordingly, the World Bank rated Egypt as the 2007 top world reformer in doing business (World Bank 2009). In 2008, however, the world financial crisis partly hit foreign investments to Egypt.⁵

Given the focus of our analysis in this paper, two characteristics of FDI patterns in Egypt should be highlighted. First, the geographic distribution of FDI in Egypt is highly unequal. While

⁴ The nominal FDI has been 36.4 billion EGP (equivalent to 6.4 billion USD).

⁵ The full impact of the crisis was felt in 2009 (Kamaly 2011). The non-petroleum FDI flows in Figure 1 were lower than 1 billion EGP.

Egypt consists of 27 governorates, 60% of FDI flows in Egypt in on average in 1992-2008 were directed to the governorates of Cairo (32%) and Giza (28%). Further, the data reveals that roughly 90% of FDI flows targeted ten governorates only (Figure A.1)⁶. Figure A.2 shows the average distribution of FDI inflows in 1992-2008 across the different regions in Egypt.⁷ The pie reflects the strongly unequal distribution among the regions. Note that each region consists of a different number of governorates, which we include, in brackets in the legend (if more than one). For example, three Suez Canal governorates attracted an average of 11% of FDI inflows, as much as eight governorates together in Lower Egypt. The five Frontier Governorates together received 7%. Upper Egypt with its eight governorates has been the least successful region in attracting FDI, receiving only 3% of FDI inflows. For a breakdown of the inbound FDI shares by governorate, see the first column of Table A.1 of the Appendix.

Second, regarding the source of FDI, both Arab and non-Arab investors play a major role for non-petroleum Greenfield FDI in Egypt. In the 1990s, the two groups of investors almost equally contributed to FDI inflows in Egypt. In the 2000s, the average share of non-Arab FDI was a bit higher (60%).⁸ The average geographic distribution of Arab and non-Arab FDI in Egypt in 1992-2008 can be seen in columns (2) and (3) of Table A.1 of the Appendix. A similar characteristic of both FDI origins is the high concentration in the top recipient governorates Cairo and Giza. However, the data also shows some differences in the average geographical distribution of Arab and non-Arab FDI. For example, a relatively higher share of non-Arab than Arab FDI targeted Cairo, Alexandria, Suez, Port Said and Damietta, whereas a relatively higher share of Arab FDI than non-Arab FDI were attracted to Giza, Ismailia, Sharkia and Behera.

2.2 Regional investment policies

Since the mid-1970s, various laws have been introduced to increase Egypt's openness to foreign investors by offering tax and investment-related incentives (UNCTAD 1999; Louis et al. 2003). In this section, we sketch the different regional (foreign) investment policies, which might have affected the regional distribution of FDI in Egypt. The policies encompass the establishment of Free Zones (FZs), Industrial Zones (IZs), Special Economic Zones (SEZs), and the regional One-Stop Shops (OSS), as well as regional representation of investment authorities in Egyptian governorates.

The key regional incentive instrument to attract FDI in Egypt has been the establishment of **Free Zones (FZs)**, which started in Egypt in 1974. According to the GAFI, which is in charge of Free Zones in Egypt, their main purpose is to increase exports and attract foreign investments. Investors in FZs are offered a package of investment incentives such as an exemption from all customs; taxes; import and export regulations; limited exemptions from labor provision; and relatively lower land rental and energy prices.⁹ To date, nine public FZs are hosted by nine different governorates in Egypt. Investors are also allowed to establish private FZs, which are single zones for large factories, or projects that cannot be accommodated

⁶ The governorates are Cairo, Giza, Alexandria, Suez, Red Sea, Sharkia, Ismailia, Damietta, Port Said, and Kalyoubia (ordered by share of average FDI flows).

⁷ We adopted the same classification of regions as the Egyptian Ministry of Planning (e.g. MOP, 2011), since it allows a better insight into the data, compared to other common classifications.

⁸ Our dataset does not reveal the specific countries of origin for annual FDI at the governorate level. However, CBE data on the second half of the last decade, as reported by Kamaly (2011), show that most Arab FDI to Egypt came from the Gulf countries (especially United Arab Emirates, Kuwait and Saudi Arabia), while most non-Arab FDI came from the US and the UK.

⁹ They are only subject to a 1% fee on goods that enter or leave the FZ. Investors in FZs can sell a certain percentage of production domestically, if custom duties are paid but they must export at least 50% of their production. Accessed on 6 September 2011. <http://www.gafinet.org/English/Pages/FreeZones.aspx>, <http://www.gafinet.org/English/Pages/InvestmentRegimes.aspx>.

in a public Free Zone in the same governorate. Private FZs benefit from the same incentive package granted to investors in public FZs (CAPMAS 2010).

One further instrument of regional industrial and investment promotion policy in Egypt is the on-going establishment of regional **Industrial Zones (IZs)** since the 1970s. IZs are mainly supposed to offer the required infrastructure for industrial projects in Egypt (M. Abdallah, the Department of Investment in Governorates, personal communication, September 26, 2011). IZs are also established in investment-scarce southern Egypt. Currently, there exist more than 70 IZs in 24 out of 27 Egyptian governorates. The three governorates that do not host any IZ are Gharbia, Red Sea and South Sinai (M. Abdallah, the GAFI Department of Investment in Governorates, personal communication, September 26, 2011).

The legal framework for establishing export-oriented **Special Economic Zones (SEZ)** in Egypt was approved in 2002. Firms operating in these zones are allowed to import capital equipment, raw materials, and intermediate goods duty free, are exempted from sales and indirect taxes and can operate under more flexible labor regulations (US Bureau of Economic and Business Affairs 2013). The development of the first SEZ in Egypt in the northwest Gulf of Suez only started in 2009 (Bräutigam and Tang 2011).

The GAFI started to establish regional **GAFI representation offices** since 1993 to be in charge of regional promotional activities as well as collecting investment-related information (M. Abdallah, the GAFI Department of Investment in Governorates, personal communication, September 26, 2011). The offices are not in charge of any executive tasks, which are conducted at the GAFI headquarters or in regional One-Stop Shops. The offices, which are affiliated to the GAFI's Department of Investment in Governorates, were established in nine governorates at different times from 1993-2007. In further five governorates, a GAFI representative, who is in charge of the same tasks as GAFI representation offices, was hired in 2008-2009.

In the context of giving the GAFI the mandate in 2004 to act on behalf of all governmental agencies and provide investors with all needed licenses and approvals, a One-Stop Shop (OSS) was established in Cairo at the GAFI headquarters with three **regional OSS branches** in Alexandria, Assiut and Ismailia. While this seems to be a good step towards decentralization of investment bureaucracy in Egypt, most foreign investors preferred to do the paperwork in Cairo nevertheless, irrespective of the investment location. A GAFI senior official argues that this is because the investor's lawyer is mostly based in Cairo (GAFI Department of Investment in Governorates, personal communication, September 27, 2011). Data provided by GAFI shows that 89% of registered companies in 2005-2010 were registered in Cairo (5% in Alexandria, 3% in Ismailia, 3% in Assiut). In section 3, we review the relevant literature and develop the hypotheses regarding FDI determinants.

3. Related Literature and Hypotheses

The location choice of foreign firms is typically determined by the expected relative profitability of investment (Cheng and Kwan 2000). Accordingly, a foreign investor would choose the most profitable destination for investment based on the destinations' relative characteristics. Relevant factors for the location choice by MNEs have been widely researched.¹⁰ They can be summarised in the following three broad categories (Dunning and Lundan 2008; Mariotti et al. 2010): (i) endowment effects, which explain why a certain economic activity would be 'naturally' attracted to a particular location; (ii) agglomeration effects, which refer to knowledge and labor spillovers and the cost-effective access to

¹⁰ The idea of location advantages is part of Dunning's eclectic theory of FDI groups, which is also known as OLI-Framework (ownership, internalization, location) (Dunning 1981, 1988). For a review of the different theoretical FDI determinants models, see Faeth (2009), who concludes that an empirical analysis of FDI determinants should combine explanatory variables from the different theoretical models and not be based on one theoretical model only.

specialized inputs; and (iii) policy-induced effects. In our analysis, we rely on this framework and group factors that potentially affect the spatial distribution of non-petroleum Greenfield FDI inflows across Egypt into three groups of variables: (1) agglomeration and market effects, (2) labor supply effects, and (3) regional investment policy effects.

3.1 Agglomeration and market effects

Economists have known the role of agglomeration since the work of Marshall (1890).¹¹ Positive externalities and economies of scale emerging from the geographic co-location of economic activities are referred to as agglomeration economies and are the focus of the growing new economic geography literature (Krugman 1991; Venables 1996; Fujita et al. 2001). Sources of agglomeration economies are knowledge and labor spillovers, as well as platforms of forward and backward linkages, which promote complementarities among firms. Those mostly outweigh competition induced dispersion forces (Kinoshita and Mody 2001; Crozet et al. 2004). Therefore, the positive externalities suggest agglomeration to be somehow self-reinforcing (Krugman 1991; Cheng and Kwan 2000). A considerable body of empirical literature shows that agglomeration has a significant effect on foreign investment location within different host countries (e.g., Head et al. (1995) and Bobonis and Shatz (2007) for the USA; Guimaraes et al. (2000) for Portugal; Head and Ries (1996), Cheng and Kwan (2000), He (2002) and Du et al. (2008) for China; Crozet et al. (2004) for France and Boudier-Bensebaa (2005) for Hungary).

Informational externalities are another relevant externality form by investment agglomerations and are shown to be important for foreign investors' location decisions (He 2002; Crozet et al. 2004; Mariotti et al. 2010). When planning a foreign investment, investors normally suffer from information asymmetry and business uncertainties, which go in hand with high information costs (Mariotti and Piscitello 1995; Caves 1996; He 2002). This holds especially for location-specific information, which is needed for the investment location decision (He 2002; Mariotti et al. 2010). Accordingly, a rational foreign investor would favour those locations that minimize information cost (He 2002).

Foreign investors normally rely on both publicly available as well as privately held information, when making a new investment decision (Kinoshita and Mody 2001; He, 2002). However, since publicly available information about characteristics and business environment at the regional level are rather limited in developing countries like Egypt, private information and information signalling become even more important for FDI decisions (Kinoshita and Mody 2001). For example, foreign investors perceive the behaviour of other firms, which took similar decisions in the past as an informational signal of relative attractiveness of this location (Kinoshita and Mody 2001; Mariotti et al. 2010). Hence, and especially given the high private costs of information gathering, foreign firms are likely to imitate other's location choices, inducing herding behaviour and locational cascades (Kinoshita and Mody 2001; Mariotti et al. 2010, Pinheiro-Alves, 2011).¹² Moreover, business-concentrated areas offer an easier and cheaper platform for exchanging private information, for example through business relationships to other foreign investors (Kinoshita and Mody 2001; He 2002). To sum up, clusters of regional investments can be regarded as locations of low information cost due to information externalities that are in place *before* making the investment location decision, and, easier information exchange *during* the investment period.

¹¹ Marshall (1890) suggested that agglomeration effects might exist within industries through lower transaction costs, sharing a common pool of labor and knowledge spillovers. Jacobs (1969) pointed to positive externalities and synergies across different industries.

¹² For a theoretical model on the relationship between herding behaviour and investments, see Scharfstein and Stein (1990).

In our analysis, we differentiate between the effects of two possible types of agglomeration on the spatial distribution of new FDI inflows: (1) the effect of foreign-specific agglomeration i.e. concentration of previous FDI, and (2) the effect of the concentration of domestic private investments.¹³ As to the former, our hypothesis is that new FDI is attracted to regions with previous FDI, due to the above mentioned agglomeration economies and information spillovers. Empirical findings from different countries mostly confirm this effect (e.g., Cheng and Kwan 2000; He 2002; Bobonis and Shatz 2007; Du et al. 2008; Mukim and Nunnenkamp 2012, among others). However, results by Guimaraes et al. (2000) suggest that foreign-specific agglomeration does not seem to matter in Portugal.

Similarly, concerning the latter, our hypothesis is that FDI is attracted to regions with higher domestic private investment due to the mentioned agglomeration and information externalities. However, we further expect that the effect of domestic private investments' concentration is higher than the effect of previous FDI concentration due to the following reasons. While a higher presence of local and foreign investments generally signals higher relative attractiveness of the host region (Kinoshita and Mody 2001), it is likely that domestic investors have better information about the most profitable investment locations in their own country (Crozet et al. 2004). This is especially the case under the high information asymmetry in developing countries like Egypt. Furthermore, foreign investors might be interested in entering joint-ventures with local investors, who bring in local knowledge and networks, and thus reduce information costs (He 2002) and fosters their co-location.

Only few empirical papers on FDI location determinants accounted for the effect of local private investments and the relative importance of both agglomeration effects. Crozet et al. (2004), who use a large sample of about 4000 foreign investments in France to thoroughly study agglomeration effects, show similar results to our conjecture that the coefficient on agglomeration with domestic firms is much higher than agglomeration with foreign firms. For the case of China, Sun et al. (2002) find a negative impact of cumulative FDI relative to cumulative domestic investment on new FDI in Chinese provinces.¹⁴

Regarding the hypothesis on the effect of local market size on FDI inflows, some literature argues that researchers should take the underlying level of regional disaggregation as well as the type of FDI into consideration (e.g., Blonigen et al. 2007; Mukim and Nunnenkamp 2012). For instance, investors are likely to be attracted to local markets with bigger size and purchasing power. However, this is more likely if horizontal FDI—where investors are mainly motivated by market access—is dominating.¹⁵ As a proxy for local market size, we use regional real GDP. We would expect a larger regional market to go in hand with more FDI, if FDI at the governorate level is mainly horizontal.¹⁶

3.2 Labor supply effects

Labor-intensive activities are an important type of FDI in developing countries. Hence, we expect FDI in Egypt to be more attracted to governorates where a larger pool of potential

¹³ Guimaraes et al. (2000) similarly disentangle agglomeration types, among which foreign-specific agglomeration.

¹⁴ In contrast, Mariotti et al. (2010) find MNEs in Italy to agglomerate with each other and only with domestic companies in case these have some comparative advantage.

¹⁵ In contrast to horizontal FDI, vertical FDI allocates certain steps of the production process to a certain location to profit from factor price differences. Thus, it is rather indifferent to local market size.

¹⁶ A body of literature specifically analyses the effect of surrounding markets on FDI location within the recipient country (e.g., Coughlin and Segev 2000; Blonigen et al. 2007; Bobonis and Shatz 2007; Mukim and Nunnenkamp 2012). In our analysis, which is the first to analyze FDI location in Egypt, we disregard potential surrounding market effects. This can be justified by Mukim and Nunnenkamp's argument (2012) that the surrounding markets' potential is less important in case of larger spatial units such as in our case of Egyptian governorates.

employees is available. As to labor costs, there is no available data at the governorate level in Egypt. However, we think that this is not a problem for our analysis, as wage disparity tends to be rather small within low-cost countries (Mukim and Nunnenkamp 2012). Even if wage disparities exist between regions, these differences will be nearly time-invariant over our sample period and, thus, be captured by the governorate dummies. Further, wage differences are likely to capture differences in labor skills and productivity.¹⁷

It is likely that investors are not only concerned by labor availability but also by its quality that is by the availability of sufficiently skilled labor force. Skilled labor has been embodied in FDI theoretical literature as a requirement for FDI inflows to developing countries (see for example Lucas 1990; Feenstra and Hanson 1997; Zhang and Markusen 1999).¹⁸ Noorbarkhsh et al. (2001) find a significant positive effect of human capital on FDI inflows to developing countries. However, evidence from within country studies is rather ambiguous.¹⁹ The ambiguous results –even for the same country– are likely driven by the use of different samples and different labor education proxies. Since it is not a priori clear, which labor education level is relevant for foreign investors, we run the regressions using different ones. Our hypotheses are that a higher labor force illiteracy rate deters investors and a larger pool of skilled labor in a region attracts more foreign investment.²⁰

3.3 Regional investment policy effects

In this section, we develop our hypothesis regarding the impact of the different regional policy instruments in Egypt, which are sketched in section 2. Although some of the policy variables are possibly linked to the agglomeration effects discussed above, we prefer to include them in a separate category due to their direct policy relevance, since they can be directly changed by modifications in regional policy. Governments often use different regional promotion policies to attract investment to relatively deprived regions (Devereux et al. 2007). Faeth (2009) reviews the empirical literature on FDI determinants and concludes that the effect of fiscal and financial investment incentives on FDI is small compared to the other determinants. If the implemented policies in Egypt were effective, we would expect them to increase FDI inflows in the respective region.

The Egyptian government established different types of zones, which are a common tool to attract foreign investments. Depending on the zone type, different incentive packages and preferential treatments are offered to attract investors. In addition to fiscal incentives, a common feature is a dedicated infrastructure.²¹ In China, for example, provinces that host Special Economic Zones (SEZ) or other zone types significantly attract more FDI (Cheng and Kwan 2000).

Concerning Free Zones (FZs) in Egypt, we expect that their hosting governorates attract more FDI due to the extensive granted package of investment incentives, the usually developed

¹⁷ Note that Kamaly (2004) does not find a significant effect of real wages on FDI inflows in Egypt at the national level.

¹⁸ Feenstra and Hanson (1997) argue that although outsourced activities from developed countries are mainly those that primarily need relatively unskilled labor from the developed country's perspective, they rather demand skilled labor from the developing country perspective.

¹⁹ In China, for instance, Broadman and Sun (1997) and Coughlin and Segev (2000) find a negative effect of illiteracy rate on FDI location, whereas Cheng and Kwan (2000) do not find any significant education effect using other three alternative proxies (population share with primary/ junior secondary/ senior secondary school education). For India, Mukim and Nunnenkamp (2012) find that FDI is attracted to districts with an educated populace (using population share with higher-secondary education), while Nunnenkamp and Stracke (2008) do not find a similar effect for Indian states (using literacy rate and enrolment in higher than primary education).

²⁰ Note that labor laws in Egypt prevent companies from hiring more than 10% non-Egyptians (OECD, 2010).

²¹ For an overview of the different types of zones, their characteristics and effects, see Akinci and Crittle (2008).

infrastructure in their surrounding areas, and the positive agglomeration externalities in well functioning FZs and their surrounding areas. Moreover, compared to other investment locations in Egypt, public information on FZs and their hosting governorates is usually more available and visible to foreign investors, and also in the English language. This is likely to reduce the cost of obtaining information by foreign investors (He 2002).

As to Industrial Zones (IZs), we expect governorates that host (more) IZs to attract more FDI due to the proper investment infrastructure that they usually provide. Special Economic Zones (SEZ) are not included in our model, since the development of the first SEZ in Egypt only started in 2009 in the northwest Gulf of Suez (Bräutigam and Tang 2011), leaving the assessment of its impact on FDI to future research.

If GAFI representation was effective in promoting the respective governorate, we would expect FDI to increase in those governorates where a GAFI representation is established. In our analysis, we include a dummy for GAFI representation to capture its potential effect on regional FDI inflows.

Finally, we account for the annual flow of public investments at the governorate level. Egypt has long been characterised by a large and dominant public sector. Despite its significant decrease since the early 1990s, public investments still constitute about 40% of total investments by the end of our sample period (MOP 2009). Analysing the relationship between public and private investments in developing countries, Blejer and Khan (1984) find that public investment in infrastructure is complementary to private investment, while other types of public investment crowd out private investment. This is because an adequate public infrastructure reduces the cost of doing business and thus attracts investments. Employing a larger sample of 116 developing countries in 1980-2006, Cavallo and Daude (2011) find a dominating crowding-out effect of private investments by public investments. Fawzy and El-Megharbel (2006) confirm the results by Blejer and Khan (1984) for the case of Egypt. The authors find that public investment in non-infrastructure activities crowds out private investment, while infrastructure public investment complements and encourages it. Since no disaggregated data on public investment is available at the governorate level, we have to remain exploratory regarding the total effect of public investments on FDI inflows.²²

3.4 FDI origin: Arab versus non-Arab FDI

We further investigate whether Arab investors, who share the same language and culture with the hosting country Egypt, behave differently than non-Arab investors in terms of their investment location determinants. To do this, we split our FDI dependent variable in a further analysis into FDI from Arab countries and those from the rest of the world.

Compared to non-Arab investors, the common language and culture are expected to facilitate Arab investor's access to relevant information for their location decision and thus, reduce their information cost. This is especially the case since many investment-relevant data and information in Egypt are only available in the Arabic language (OECD, 2010).²³ Moreover, the common language and culture is likely to go in hand with more local knowledge and easier direct as well as informal communication with locals. The latter would facilitate obtaining privately held information. On the contrary, the higher cultural distance and language barrier of non-Arab investors are likely to go in hand with higher uncertainties, information asymmetries and information costs.

²² Note that the effect of public investment on FDI to Egypt at the national level is insignificant, according to Kamaly (2004).

²³ My own field work experience in collecting data and information for this project very much supports this argument. Most information and data at the governorate level is very difficult to access and only available in Arabic.

Based on our discussion above on information costs, FDI inflows are expected to follow the location choice of previous investments more, when uncertainties and information costs are higher.²⁴ Consequently, we hypothesize that –compared to Arab FDI– non-Arab FDI in Egypt would have a higher tendency to agglomerate with previous FDI and domestic private investments. That is, we expect a higher herding behaviour by non-Arab investors regarding their investment location.²⁵

4. Empirical Estimation and Data

To empirically investigate our hypotheses on the determinants of regional FDI inflows in Egypt, we employ a panel data regression of 26 Egyptian governorates over the period 1992-2008.²⁶ We begin our estimations with a panel of aggregate FDI inflows, that is, FDI from all regions of the world. In a second analysis on the role of cultural and language similarity, we split our sample into two sub-samples where we distinguish between FDI inflows from Arab countries (Arab FDI) and FDI inflows from the rest of the world (non-Arab FDI). Our model time frame is mainly restricted by the available data on regional GDP. The panel is unbalanced due to lack of data on the population-scarce frontier governorates in the 1990s.

We estimate the following panel data model:

$$y_{it} = \alpha_i + \beta' x_{it} + \mu_t + \eta_{it}$$

α_i denotes the governorate-specific effect, μ_t is a time-specific effect, and η_{it} is an error term. y_{it} stands for our dependent variable, which is the aggregate real FDI flow in Model 1, the Arab real FDI flow in Model 2 and the non-Arab real FDI flow in Model 3.²⁷ The time specific effects are those that affect all governorates in a year such as new relevant national or international policies or shocks that affect all regions equally. The governorate-specific effects capture any time-invariant governorate characteristics such as geographic location or natural resource endowments.²⁸ As described above, we group the explanatory variables into three sets.

Agglomeration and market variables include the real FDI stock to account for foreign-specific agglomeration, the stock of real domestic private investments to account for agglomerations with domestic private investments and the real GDP to account for market size and potential.

²⁴ Similarly, Mariotti et al. (2010) argues that the higher the uncertainty in the local context and the higher the relevant information costs, the more MNEs are likely to imitate other MNEs.

²⁵ A body of literature analyses whether foreign investors precisely prefer those locations where investors from the same country of origin are located (e.g. Head et al. 1995; 1999; Crozet et al. 2004; Bobonis and Shatz 2007; Mukim and Nunnenkamp 2012). However, the aggregation level of our data does not allow testing this hypothesis. In a robustness analysis, we check whether foreign-specific agglomeration can be found among Arab or non-Arab FDI, respectively.

²⁶ Egypt consists of 27 governorates. However, we merged the governorates Qena and Luxor for the sake of consistency, since Luxor was only split from the governorate Qena and become a single governorate in 2010. Before 2010, Luxor has been a Supreme City attached to the governorate of Qena. Thus, most data sources do not report separate data for Luxor for this time.

²⁷ We use the amount of FDI inflows as dependent variables rather than employing a discrete choice model of investment projects, since the latter would limit the analysis to determinants of a discrete FDI location choice, without taking the magnitude of FDI activity into consideration (Blonigen et al.2007). Moreover, our GAFI data does not separately report the number of foreign investment projects.

²⁸ In our attempt to get available proxies for infrastructure, we found that the main port or airport in each governorate–if any– has been already built long before the time frame of our analysis. Hence, the presence of a port and the presence of an airport are captured by the governorate specific effect as well. Moreover, the governorate’s degree of urbanisation is also captured by the governorate dummy, since data on the urbanisation rate, which is available in the Egypt Human Development Reports by UNCTAD for some years throughout our sample time frame, hardly shows any variations over time.

Table 1 describes all variables while more information on the variables and data sources can be found in the Appendix.

As to labor market variables, we include the labor force to capture labor abundance. We use stock instead of flow variables on education, as the former capture the education level of labor force better (Noorbarkhsh et al. 2001). A priori, it is not clear which level of labor education is relevant for foreign investors. Therefore, we run the regressions with different levels of labor education. We first employ two proxies in our regressions: (a) labor force illiteracy rate and (b) share of labor force that holds an intermediate or higher level of education (equivalent to secondary education or higher). As a robustness check, we substitute the latter by the share of labor force that holds a university degree.

The final group includes regional investment policy variables. To capture the effect of Free Zones, we use the real investment stock in FZs. We opt for this specification instead of employing a dummy variable on FZ existence for two reasons. First, we avoid having a nearly time-invariant dummy variable on FZ existence since most FZs have been established before the period of our analysis. Second, our proxy takes the FZs' actual operation into account. Governorates with well-established FZs that host a higher stock of investments are expected to attract more FDI.²⁹ To capture the presence of IZs, we include the sum of the area of all FZs in a governorate. This seems to capture the IZ effect better than using the number of IZs in a governorate, as the size of IZs in Egypt substantially varies.³⁰ We further use a dummy variable, which is coded 1 if the GAFI is represented in a governorate and 0 otherwise. As the establishing years of GAFI representations range between 1993 and 2007, the dummy variable contains much variation over time. Finally, a further variable on the annual real public investments is included.

Given the skew of our FDI data, we adopt a log-linear specification, which helps transform a non-linear relationship between FDI inflows and the explanatory variables into a linear one. Consequently, our regression coefficients measure elasticity of FDI inflows with respect to the explanatory variables. To allow for some time lag for the different explanatory variables to have an impact on foreign investment decisions and to avoid endogeneity, we lag the explanatory variables by one year. Cluster-robust standard errors are used.

5. Results

Table 2 provides the regression results for the different specifications of our model, which we discuss in the following.

5.1 Aggregate FDI

In Model (1), we regress the explanatory variables on the logged real inflows of aggregate FDI. The model is jointly significant at the 1% level as shown by the F-test of joint significance at the bottom of the table.

Regarding the agglomeration and market variables, we do not find a significant effect of real FDI stock on new real FDI inflows. Thus, we reject our hypothesis on FDI foreign-specific agglomeration. This is an interesting result, given the strong FDI spatial concentration in Egypt. Our result implies that foreign firms are not attracted to locations of previous FDI per se and that other factors seem to induce the concentration. Our result differs from common findings from other countries, which find that new FDI is significantly attracted to locations of former FDI. Our result is rather similar to Guimaraes et al. (2000) for FDI in Portugal. We argue that the unexpected lack of foreign-specific agglomeration of Greenfield FDI in Egypt is rather

²⁹ Similar to this argument, Wang (2013) finds that later established SEZs in China have a smaller effect on FDI than older ones.

³⁰ It was impossible to obtain data on annual investment amounts in IZs in order to have similar data to FZs.

good news. This is because self-reinforcement of FDI location would indicate a level of path-dependency, which cannot be easily influenced by policymakers, who aim to stimulate investments in investment scarce regions. Our result indicates that it is not too late for governorates, which have been less attractive for foreign investors so far to attract new, or more FDI in the future.

In line with our conjecture, our results show a positive effect of the concentration of domestic private investments on FDI inflows. That is, a 1% higher stock of Egyptian private investments increases FDI inflows to the same governorate by 0.4% at the 10% significance level. Our results are also in line with our hypothesis on the higher relative importance of agglomeration with domestic firms. In fact, foreign specific agglomeration is not significant at all. While forward and backward linkages as well as joint-venture options are expected to be more existent where domestic investment is concentrated, domestic investors are likely to have better information with respect to profitable locations (Crozet et al. 2004). Sun et al. (2002) and Crozet et al. (2004) find similar results to ours with regard to the relative importance of both agglomeration effects. Since many empirical studies on FDI location determinants in other countries do not take local investments into account, it would be interesting to see whether including local private investments changes their FDI coefficients. In our case, omitting the variable on domestic private investments does not change our result on FDI stock.

Our estimated effect of GDP is not statistically significant. Accordingly, a governorate's higher GDP does not seem to attract more FDI inflows. Our results suggest that FDI within Egypt is mostly not horizontal.³¹

As to the labor supply effects, we find—in line with our conjecture—a positive effect of labor abundance on FDI inflows at the 10% significance level. The effect is quite large; the elasticity of 1.6 is greater than unity implying a quite elastic relationship. However, the data rejects our hypotheses on the effect of labor education. We find that higher illiteracy of labor force at the governorate level does not seem to deter foreign investors at any reasonable significance level. Further, labor force education, in terms of at least secondary school education, shows an insignificant effect as well. Both labor education variables are also jointly insignificant ($F(2,25)=0.86$). Consequently, our results suggest that labor education is not a determinant of FDI location in Egypt.

Although our result is similar to Méon and Sekkat (2004) for MENA countries and Cheng and Kwan (2000) for China³², it is still surprising, when recalling that skilled labor shortage is often mentioned as an obstacle for foreign investors in Egypt (UNCTAD 1999³³; US Bureau of Economic and Business Affairs 2013). We propose three possible explanations for our different finding. First, the difference might be driven by the discrepancy between formal education in Egypt and the professional skills needed in the labor market (UNDP 2010; World Bank 2007). This would suggest that our proxies do not capture well the needed labor skills by foreign investors. Second, an alternative explanation might be that while (foreign) investors do care about skilled labor, they do not care much about its abundance at the chosen investment location, because they rely on the relative ease of internal migration in Egypt. Third, the result could be driven by the FDI aggregation across different sectors, which might require a different level of skill intensity.

³¹ Note that the insignificant FDI stock and GDP variables are also jointly insignificant. Moreover, our results are robust to estimating the model with the group of agglomerations variables only.

³² Méon and Sekkat (2004) use primary education as a proxy.

³³ UNCTAD (1999) reports survey results where foreign investors in Egypt have been asked about obstacles to business establishment and operation. On a scale from 0 to 5 (highest rank), the average investors' score on the factor 'labor skills' was about 3.5.

Regarding the policy variables, our results reveal a significantly positive effect of Free Zones, while the effect of Industrial Zones is not significantly different from zero. The result is consistent with the greater investment incentives and preferential treatment to FDI, which are offered at FZ compared to IZ in Egypt. Similarly, Cheng and Kwan (2000) find the effect of SEZ in China to be higher than other zone types, which is in line with their higher preferential treatment to FDI. Specifically, our FZ elasticity estimate suggests that governorates with 1% higher investment operations in FZs receive 0.15% more FDI inflows. Our result is in accordance with our conjecture and implies that the presence of well-operated FZ promotes FDI inflows to the governorate in which the FZ is located. The FDI could be targeting the FZ itself to profit from granted incentives and provided infrastructure or targeting the FZ governorate in general which is likely to have better infrastructure and offer agglomeration externalities.³⁴

The presence of a GAFI office or representative does not have a significant effect on FDI at any reasonable significance level. This suggests that the activities by the GAFI local representation have not significantly promoted FDI inflows in the respective governorate.³⁵ Finally, we find no significant effect of real public investment on FDI inflows. Our result is in line with findings by Kamaly (2004) for FDI in Egypt at the national level.

5.2 Arab versus non-Arab FDI

In model (2), we regress the logged real FDI inflows from Arab countries on the same ten explanatory variables as in model (1), whereas, in model (3), we regress the logged real FDI inflows from the rest of the world (non-Arab countries) on the same ten explanatory variables. Our regression results reveal interesting differences between Arab and non-Arab FDI in terms of their location determinants.

Although model (2) on non-Arab FDI is jointly significant, none of the ten explanatory variables is significant at any reasonable significance level.³⁶ The ten variables, as well as each of the three groups of variables, are also jointly insignificant. Accordingly, only the groups of significant time as well as governorate dummies contribute to the significance of the model. Other than in the case of Arab FDI, our results from model (3) show that domestic private investment, FZs as well as public investment matter for non-Arab FDI to Egypt in a significant and economically relevant way. Consequently, our results seem to suggest that regional Arab investors might be at maximum affected by long-run economic effects (which are time-invariant in our sample period and captured by our fixed effects), but not by any (short-run) economic effects, which are incorporated in our model. Our finding seems to be in line with empirical findings by Sekkat (2014), who shows that—other than non-Arab FDI in Arab countries—economic and institutional variables do not affect intra-Arab FDI. A possible explanation offered by Sekkat (2014) is that intra-Arab FDI is rather largely influenced by regional strategic considerations of government related entities. Similarly, Bolbol and Fatheldin (2006) posit that intra-Arab FDI is rather determined by non-economic factors where relationship plays a major role. An official at the Egyptian Ministry of International Development (personal communication, March 23, 2014) puts forward a similar argument on Arab FDI in Egypt, stating that 'political reasons played a major role in the location of Arab FDI under the time of ex-president Mubarak'.

³⁴ The FDI stock variable remains insignificant when excluding the FZ variable from our model.

³⁵ However, we would like to mention that such local representation seems to be a good step towards a decrease of centralisation in a highly centralized country like Egypt and towards improving the collection of scarce regional data on investment locations.

³⁶ Only the variable labor force is close to significance (p-value=0.13).

As to the non-Arab investors, our findings show that governorates with a 1% higher stock of Egyptian private investments receive 0.4% higher non-Arab FDI. The result is in line with our conjecture that non-Arab investors, who face higher uncertainties and information costs, follow more the location of Egyptian private investors. Non-Arab investors are also likely to be more interested in joint ventures with local investors, who bring in local knowledge and networks, as well as the ability to deal with challenges of local bureaucracy.

Moreover, we do not find a significant effect of FDI stock on new non-Arab FDI inflows. This confirms our finding from model (1) that agglomerations with local private investments, rather than with previous FDI, play a significant role in their location. We also do not find a significant effect of GDP, labor education, and IZ or GAFI offices on non-Arab FDI, which is similar to our result for aggregate FDI.³⁷

Our results further reveal the significance of FZs for non-Arab FDI location. The coefficient is higher than in model (1) on aggregate FDI, where Arab FDI inflows were also included. Governorates with 1% higher FZ operation activities attract 0.26% higher non-Arab FDI flows. In addition to the provided FZ's incentive package, FZs and their hosting governorates are low information cost areas for non-Arab Investors due to the better availability of (English) information. Our result that FZs do not significantly matter for Arab FDI seems again to be in line with findings by Sekkat (2014).³⁸

Finally, our results show a negative effect of public investment flows on the non-Arab FDI location. A 1% higher public investment flow is associated with 0.69% less non-Arab FDI, significant at the 5% level. This result suggests a dominating crowding out effect of non-Arab FDI by the Egyptian state owned enterprises, which have a dominant role in the Egyptian economy. For example, the public sector still accounts for about 40% of the country's production (ADB 2009). On the contrary, public investment does not seem to crowd-out Arab FDI, which might be due to the relevance of political relationships and considerations for Arab FDI, as argued in our interview with an official at the Egyptian Ministry of International Development (2014).

5.3 Robustness checks

We conduct several robustness checks. First, since our different results for Arab and non-Arab FDI could be partly driven by differences in their sectoral composition, we re-run our regression models while restricting the FDI inflows to those in the manufacturing sector only. We conduct the analysis for manufacturing FDI for various reasons. First, the manufacturing sector hosts the largest share of FDI in Egypt. Second, FDI flows into this sector show the highest geographic dispersion in Egypt. For more details on sectoral FDI in Egypt, see Hanafy (2014). Third, agglomeration externalities, in terms of economies of scale and forward and backward linkages, are expected to be mostly pronounced in this sector. Fourth, many agricultural activities as well as some services, such as tourism in Egypt, are partly location bounded which limit the investor's location choice. Accordingly, we re-run the regressions, using (1) Arab FDI and (2) non-Arab FDI, both restricted to the manufacturing sector, as dependent variables. The results are in line with our findings above, suggesting that the

³⁷ These variables are also jointly insignificant. Similar to Arab FDI, our variable on labor endowment has a p-value of 0.12. Our result on labor education is in line with Sekkat (2014), who find that primary and secondary education has no significant effect on non-Arab FDI in Arab countries.

³⁸ In addition to the positive investment incentives, FZs are specifically attractive for export-oriented FDI. Sekkat (2014) finds that—in contrary to non-Arab FDI in Arab countries—openness does not significantly matter for intra-Arab FDI.

differences in location determinants between Arab and non-Arab FDI are not driven by their sectoral composition.³⁹

Second, as it is not a priori clear, which level of labor education matters for FDI in Egypt, we substitute our variable on secondary education by the share of labor force that holds a university degree. We do not add both variables in the model for multicollinearity reasons. Our education results do not change for aggregate FDI, Arab FDI and non-Arab FDI alike. In fact, we find a negative coefficient for university education, significant at the 10% level. While Sekkat (2004) similarly finds primary and secondary education to be insignificant for non-Arab FDI in Arab countries, he finds a positive effect of tertiary education, which we cannot confirm in the specific case of the location of non-Arab FDI in Egypt.

Third, we check whether foreign-specific agglomeration can be found among Arab or non-Arab FDI, respectively. To do this, we re-run the regressions in models (2) and (3) while splitting our explanatory variable on FDI stock into two explanatory variables; (a) Arab FDI stock and (b) non-Arab FDI stock. The regression results do not show any agglomerations among Arab FDI, nor among non-Arab FDI.⁴⁰

Forth, our results are also robust to sample modifications, such as (i) re-rerunning our regression models based on the available balanced panel, (ii) excluding from our sample the governorates Cairo and/or Giza, which host the most FDI, or (iii) excluding from our sample the two Sinai governorates, which have some special (time-variant) regulations regarding foreign investments.

6. Concluding Remarks

This paper is the first attempt to investigate the determinants of FDI spatial distribution in Egypt based on a novel panel dataset of Egyptian governorates. Our results suggest that domestic private investment, well-functioning Free Zones, as well as labor abundance are regional pull factors of FDI inflows to Egypt. Regional policies in Egypt—with the exception of Free Zones—do not affect the unequal FDI spatial distribution in the country, which is an important message for policymakers. Despite the strong spatial concentration of FDI in Egypt (Hanafy 2014), our results do not support that new FDI flows is attracted to regions with higher previous FDI, as often found in the literature. Our result implies that foreign firms are not attracted to locations of previous FDI per se and that other factors seem to induce the concentration.

We argue that the lack of foreign-specific agglomeration of FDI in Egypt is rather good news for the remote governorates. This lack of path-dependency indicates that it is not too late for governorates, which have been less attractive for foreign investors so far to attract new, or more FDI in the future. The current concentration of FDI in only few regions might prevent the dissemination of possible positive FDI effects in the whole economy and thus, increase regional divergence (Mumkin and Nunnenkamp 2012). Recent political events in Egypt show that inequality can be a major source of political unrest in the country. Our results suggest that facilitating domestic private investments in investment-scarce regions in Egypt (e.g. through financial reforms and better access to credits) could increase both domestic private and foreign investments in these regions.

Our analysis further reveals substantial differences between the location determinants of FDI from countries of the Arab region and FDI from the rest of the world. These differences also hold when restricting the analysis to manufacturing FDI only. Agglomeration of domestic private investment and Free Zones seem to positively affect the spatial distribution of non-Arab

³⁹ All robustness results are available upon request.

⁴⁰ Our finding, of course, cannot exclude agglomerations of FDI from the same source country. This cannot be analyzed given the aggregation of available data.

FDI, but not FDI from Arab countries. Arab investors, who share the language and culture with the FDI host Egypt, are more willing to invest in less investment-agglomerated areas. The good news about it is that Arab FDI could contribute to decreasing the high inequality of investment distribution in Egypt. Our results further imply that Arab FDI is less affected by economic considerations and incentives, similar to Bolbol and Fatheldin (2006) and Sekkat (2014) on intra-Arab FDI. This makes Arab FDI less vulnerable to times of economic downturn and instability as in the current post-uprising era in Egypt.

Finally, we would like to recommend substantial improvements of the GAFI website, which is the major tool for disseminating information on investment sights in Egypt. We should mention that the GAFI website—in both its Arabic and English version—has often been down (not available) during our time of research. A substantial improvement of the availability, quality and dissemination of information material about the different governorates and investment sights in Egypt, and also in the English language, is likely to information asymmetries by foreign investors. GAFI representation offices in the different governorates could play a major role in this issue.

Our analysis is limited by the availability of data and could be expanded in many directions. For example, the availability of a panel of firm data would further decrease potential endogeneity concerns and allow for a more rigorous analysis of agglomeration effects. Further, the analysis of location determinants would profit from the possibility to distinguish between 100% foreign enterprises and joint ventures. Moreover, FDI data by country of origin at the governorate level would allow for a better integration of source-country-characteristics, as well as the analysis of possible country-specific agglomerations, and could be the next step toward a more rigorous analysis of the role of cultural distance on FDI location. Future research should analyse the effects of FDI on growth and development at the regional level in Egypt. Employing spatial econometric techniques would enhance the models' ability to account for geographical factors.

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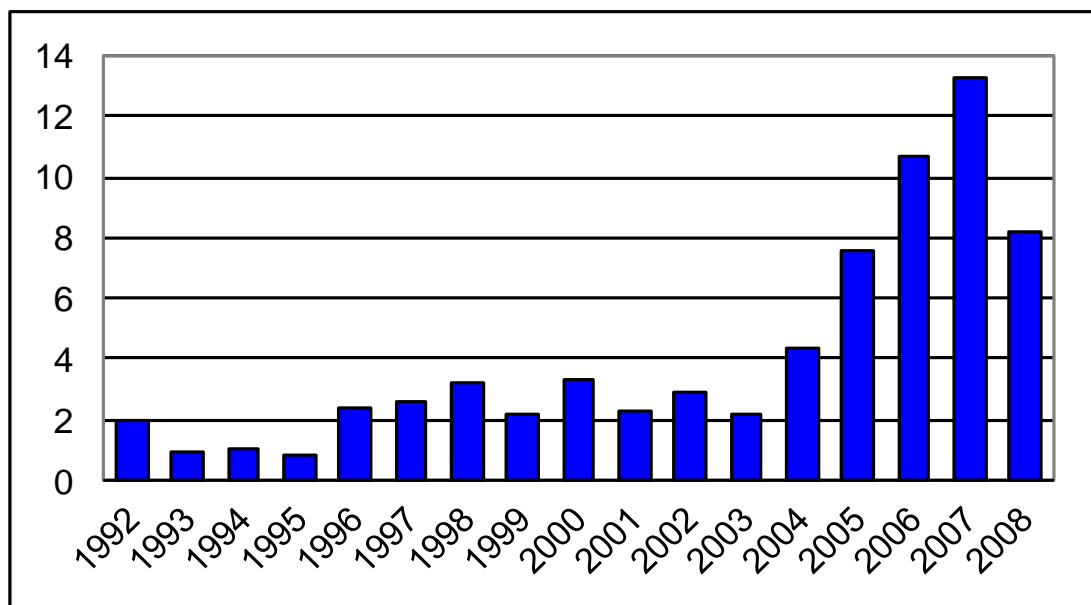
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Figure 1: Flow of Real 'Non-petroleum Greenfield' FDI to Egypt in 1992-2008 (In Billions EGP at Constant 1992 Prices)



Author's calculations, based on data by GAFI.

Source:

Table 1: Definition of Model Variables and Expected Sign of Explanatory Variables

Variable	Description	Expected Sign
<i>Dependant variables</i>		
(1) FDI flow	Real FDI flow (log)	
(2) Arab FDI flow	Real Arab FDI flow (log)	
(3) Non-Arab FDI flow	Real non-Arab FDI flow (log)	
<i>Explanatory variables</i>		
Agglomeration & market variables		
FDI stock	Real FDI stock (log)	+
Domestic private investment stock	Real domestic private investment stock (log)	+
GDP	Real GDP (log)	(+)
Labor market variables		
Labor force	Share of labor force in population in % (log)*	+
Labor force illiteracy rate	Share of illiterates in labor force in % (log)	-
Labor force holding secondary education	Share of labor force holding secondary education in % (log)	+
Regional investment policy variables		
Free Zone	Stock of real investments in Free Zones (log)	+
Industrial Zone	Sum of total area of Industrial Zones (in feddan, log)	+
GAFI representation	Dummy equal to 1 if GAFI is locally represented and 0 otherwise	+
Public investment	Real public investments (log)	?

Notes: All real variables in 1992 prices. Where indicated, the logarithm of the variable (+ 1) is taken, that is, one is added to allow of a zero observation. * We do not take the absolute number of labor force for collinearity with the GDP variable.

Table 2: Fixed-Effects Estimation Results

Dependent variable	Model 1 Aggregate FDI (log)	Model 2 Arab FDI (log)	Model 3 Non-Arab FDI (log)
Agglomeration & market variables			
FDI stock (log)	-0.13 (0.15)	-0.09 (0.06)	-0.07 (0.17)
Domestic private Investment stock (log)	0.41* (0.21)	0.09 (0.12)	0.39* (0.22)
GDP (log)	0.29 (0.78)	-0.04 (0.61)	0.43 (0.93)
Labor market variables			
Labor force (% pop, log)	1.61* (0.93)	1.22 (0.78)	1.13 (1.10)
Labor force illiteracy rate (% , log)	-0.43 (0.38)	0.12 (0.31)	-0.5 (0.36)
Secondary education (% labor force, log)	-1.21 (1.09)	-0.74 (0.72)	-0.87 (0.74)
Policy variables			
Free Zone (log)	0.15* (0.08)	0.05 (0.05)	0.26*** (0.10)
Industrial Zone (log)	0.00 (0.06)	-0.05 (0.04)	0.02 (0.05)
GAFI representation	0.22 (0.33)	-0.12 (0.18)	0.23 (0.34)
Public investment (log)	-0.49 (0.31)	-0.16 (0.29)	-0.69** (0.27)
Constant	-4.00 (17.15)	1.10 (13.08)	-6.15 (20.82)
Model joint significance	F(25,25)=20388***	F(25,25)=222***	F(25,25)=364***
Time dummies (significant)	Yes	Yes	Yes
N	376	376	376
R ² for within model	0.38	0.34	0.31

Notes: (i) *, **, *** indicate significance at a 10%, 5%, and 1% level, respectively. (ii) Dependent variables are the logged real inflows of aggregate FDI in Model 1, the logged real Arab FDI inflows in Model 2, and the logged real FDI inflows from non-Arab countries in Model 3. (iii) Coefficient estimates, except for GAFI representation, are elasticity estimates due to the log-log form. (iv) Cluster-robust standard errors are used and reported in brackets below each coefficient estimate.

APPENDIX

Appendix A: Data sources and details

The appendix explains sources and background information for the data used in the analysis.

Dependent variables:

- Real FDI flow (in million EGP, log). The FDI inflows are based on unpublished raw data of registered investments by foreign enterprises at the General Authority for Investment and Free Zones (GAFI). Real figures have been calculated using the GDP deflator (1992=100) reported by the World Bank. The logarithm of the variable (+ 1) is taken where one is added to allow of a zero observation.
- Real Arab FDI flow (in million EGP, log). Calculation similar to real FDI. Source: GAFI
- Real non-Arab FDI flow (in million EGP, log). Calculation similar to real FDI. Source: GAFI

Exploratory variables:

Market and agglomeration variables

- Real FDI stock (in million EGP, log). The real FDI stock is defined as the amount of cumulative real FDI flows from 1970 until the end of the respective year at 1992 prices (see real FDI flow above). Egypt's open door policy started in 1974, but the country saw the first inflows previously in 1972. Many governorates, however, started to have positive FDI stocks in the 1990s only. To calculate the real FDI stock, we used an annual depreciation rate of 4% according to the calculations by Hevia and Loayza (2011) for Egypt. The logarithm of the variable (+ 1) is taken where one is added to allow of a zero observation.
 - Real Arab FDI flow (in million EGP, log). Calculation similar to FDI stock.
 - Real non- Arab FDI flow (in million EGP, log). Calculation similar to FDI stock.
- Real Stock of domestic private investments (in million EGP, log). Calculation similar to FDI stock. Source: GAFI.
- Real GDP (in million EGP, log). Data on nominal GDP per capita have been collected from several Egypt Human Development Reports by UNCTAD in English and Arabic. These reports are not conducted annually and thus, data are missing for a few years. Where possible, we used Governorates Human Development Reports made available by the National Institute of Planning to fill in missing data on governorate's GDP per capita. To fill in remaining gaps, we conducted a linear interpolation. We used the GDP deflator (1992=100) reported by the Word Bank to obtain real figures. The annual GDP per capita has been multiplied by the population at the governorate level to obtain the governorate's GDP. Finally, the logarithm of the real GDP is taken. Note that GDP data on the population-scarce frontier governorates are only available since 2000. Thus, our panel is an unbalanced one.
- We obtain the population data at the governorate level from two sources: (1) the population since 1995 is collected from available CAPMAS yearbooks; (2) the population for the period 1990-1992 is obtained from the Annual Labor Force Sample Issues by CAPMAS. To bridge the gap of the two missing years of 1993 and 1994, we conducted a linear interpolation of population data.⁴¹

⁴¹ Similarly, Blonigen et al. (2007) use linear interpolation to fill missing data.

Labor market variables

Data on labor force and labor force education are from the Annual Labor Force Sample Issues by CAPMAS. As no issue is available for the year 1996, the data has been interpolated to fill this gap.

- Labor force. This is the share of labor force in population in percentage. The logarithm of the variable is taken.
- Labor education. We use three proxies for labor education: (a) the share of illiterate labor force in percentage, (b) the share of labor force that holds at least an intermediate level of education (equivalent to at least secondary education) and (c) the share of labor force that holds a university degree. The logarithm of the respective variable is taken.

Regional investment policy variables

- Free Zones (FZ). This is the stock of investments in Free Zones (in million EGP, log). Unpublished raw data on issued capital in Free Zones was provided by the GAFI's Department of Free Zones. We converted the data from US Dollar to Egyptian Pounds using the year average exchange rate by IMF. Real investment figures have been calculated using the World Bank's GDP deflator (1992=100). An annual depreciation rate of 4% (Hevia and Loayza 2011) is used to calculate the real stock of investments. The logarithm of the variable (+ 1) is taken.
- Industrial Zones (IZ). This is sum of Industrial Zones' area (in feddan; 1 feddan = 0.42 hectares = 4200 square meters). The unpublished raw data on areas of different Industrial Zones is obtained from two complementary sources: (i) GAFI's Industrial Zones Department and (ii) the Industrial Development Agency (for IZs in new urban community cities). The logarithm of the variable (+ 1) is taken.
- GAFI representation. A dummy equal to 1 if a GAFI office or a GAFI representative for local promotional activities locally represents the GAFI and 0 otherwise. Source: Unpublished raw data by the GAFI's Department for Investment in Governorates.
- Public investment (in million EGP, log). It was only starting in 1997 that unpublished regional public investment data, which were made available by the Ministry of Planning, are disaggregated at the governorate level. For the years before 1997, only annual aggregate public investments were made available according to five-year-plans. To estimate public investments per governorate for 1992-1996, we made the assumption that a governorate's share in total public investments is the same as the average of the following five years (1997-2001). To obtain real investment figures, we used the GDP deflator (1992=100) by World Bank.

Appendix B: Tables

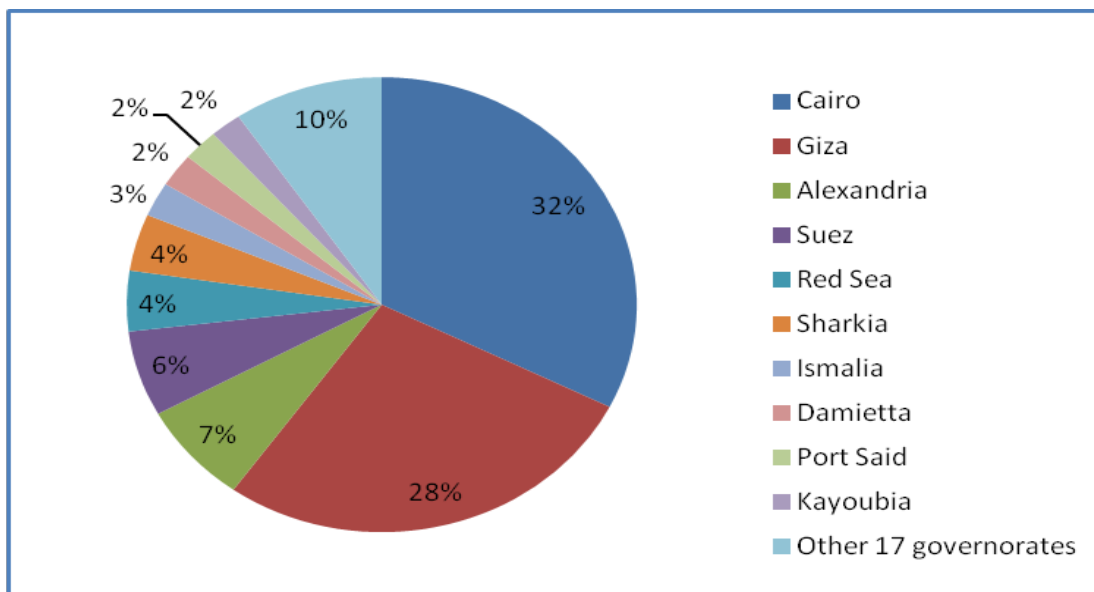
Table A.1: Distribution of ‘Non-Petroleum Greenfield’ FDI across Egyptian Governorates and Regions (average of 1992-2008), by Origin

Governorates and regions	Aggregate FDI (%)	Arab FDI (%)	Non-Arab FDI (%)
Cairo	32.42	28.90	35.15
Giza	27.46	32.71	23.44
Alexandria	7.16	4.80	8.99
<i>Suez Canal Governorates</i>	10.77	9.64	11.56
Port Said	2.25	0.68	3.46
Suez	6.08	4.38	7.30
Ismalia	2.44	4.58	0.80
<i>Lower Egypt</i>	11.34	11.15	11.49
Damietta	2.37	0.50	3.82
Dakahlia	0.16	0.25	0.09
Sharkia	4.04	5.55	2.88
Kalyoubia	1.99	1.60	2.29
Kafr El-sheikh	0.08	0.03	0.12
Gharbia	0.33	0.03	0.56
Menoufia	1.44	1.33	1.53
Behera	0.92	1.85	0.21
<i>Upper Egypt</i>	3.47	4.30	2.83
Beni Suef	1.24	1.09	1.35
Fayoum	0.66	1.30	0.17
Menia	0.44	0.23	0.61
Assuit	0.19	0.05	0.30
Suhag	0.03	0.02	0.03
Qena	0.03	0.02	0.03
Luxor	0.07	0.08	0.07
Aswan	0.81	1.51	0.27
<i>Frontier Governorates</i>	7.88	8.55	7.37
Red Sea	4.29	5.43	3.42
New Valley	0.15	0.30	0.03
Matrouh	0.32	0.47	0.21
North Sinai	0.92	0.29	1.40
South Sinai	1.45	2.01	1.02

Source: Author's calculations based on GAFI data.

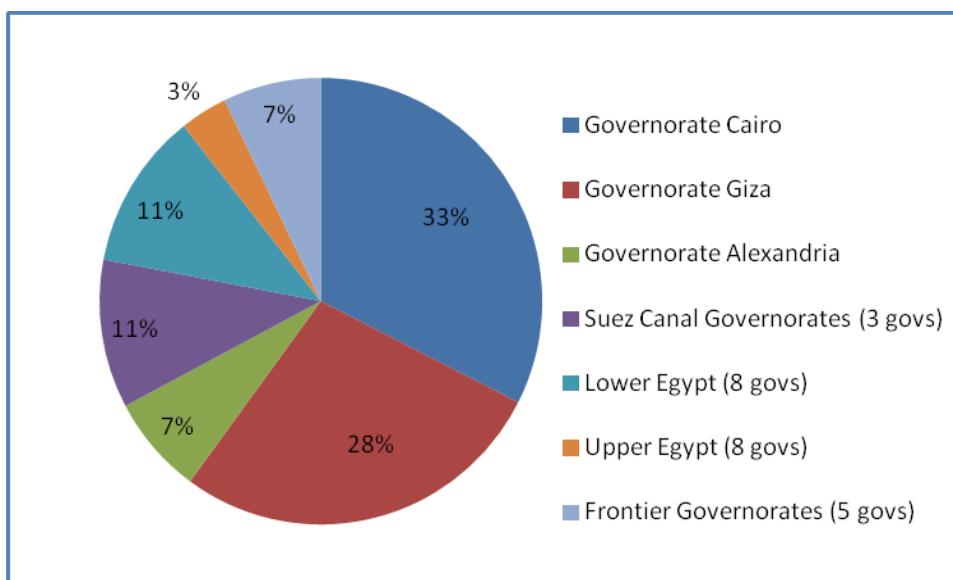
Appendix C: Figures

Figure A.1: Distribution of ‘Non-petroleum Greenfield’ FDI Flows by Governorates in Egypt (average of 1992-2008)



Source: Author's calculations based on GAFI data.

Figure A.2: Distribution of ‘non-petroleum Greenfield’ FDI Flows by Regions in Egypt (average of 1992-2008)



Notes: 'govs' is used as an abbreviation of governorates. The Suez Canal governorates are Ismailia, Port Said and Suez. The Lower Egypt governorates are Behera, Damietta, Dakahlia, Gharbia, Kafr El-Sheikh, Kalyoubia, Menoufia and Sharkia. The Upper Egypt governorates are Assuit, Aswan, Beni Suef, Fayoum, Luxor, Menia, Qena and Suhag. The Frontier Egypt governorates are Matrouh, North Sinai, New Valley, Red Sea and South Sinai.

Source: Author's calculations based on GAFI data.