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EU Aid and Foreign Direct Investment

A Study of the Effectiveness of EU Sector ODA on FDI in
Developing Countries

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Abstract

Research on aid is continuously exploring new channels to measure its effectiveness on economic development. The Millennium Development Goals have set the standard for aid policy-making and now, when facing deadline, its partakers have to set a new aid policy-agenda. The European Union is the largest donor of official development assistance (ODA), contributing a total of 50-60 percent of world ODA. Still the EU struggles with finding conclusive evidence of the effectiveness of aid. In the light of the above, this paper provides a panel data regression analysis of whether EU aid shows any short-term effect on foreign direct investments in developing countries and if so, if it is possible to distinguish what kind of EU aid is most effective in doing so. ODA is subcategorized into three target sectors: economic infrastructure, production sectors and social infrastructure. The study takes its stand from FDI- and aid theory, relative developing countries and in the light of the EU. The effectiveness of EU ODA on FDI-inflows to developing countries is tested using a fixed effects OLS estimator and undergoes three sensitivity checks. The result shows that EU ODA has a positive statistical significant effect in promoting FDI and that a narrower approach is required to determine the sectorial effects respectively.

Key words: sector ODA, FDI, EU, panel data regression analysis, OLS,

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1 Introduction

Most researchers agree: economic growth is the key for developing countries to reduce poverty, and the Millennium Development Goals have come to set the agenda for policy construction within the field of sustainable development through the last decade. However, the effectiveness of aid on economic growth has been widely disputed among researchers. Newer research looks away from the gross domestic product as a standard, and investigate other channels for aid to promote development. This is especially relevant within the European Union, globally the largest donor of official development aid. As the Millennium Declaration reaches its deadline 2015, its partakers will have to review and potentially redefine their post-2015 objectives.

The European Union (EU) has modeled its development policies around the millennium development goals (MDGs) and is the largest official development assistance (ODA)-donor in the world, contributing 50-60% of total ODA (EU, 2013, p. 46, 222, 2013). Still the European Report on Development (2013) finds it hard to evaluate EU's effect of their activity in the MDGs. The development goals and strategies are now being reviewed and reassessed as a new policy agenda for development is on the table. In the light of EU's new agenda to go "beyond aid" and finding new channels for economic development, a study looking at EU aid effectiveness on foreign direct investment is most current and highly relevant.

The new goal is to go "beyond aid" and investment is highlighted as such a potential channel. This paper provides an empirical econometric study of whether EU aid shows any short-term effect on foreign direct investments in developing countries and if it is possible to distinguish what kind of EU aid is most effective in doing so. Empirical studies on the topic are limited and have inconclusive results, which encouraged the research question of this study: *Does EU official development assistance have any effect on world foreign direct investment in developing countries? And if so, can we detect what kind of EU official development assistance is most efficient?*

I perform a fixed effects panel-data regression analysis on 59 developing countries covering the timespan 1995-2012, using EU sectorial ODA data, a number of control variables estimated by OLS. EU official development assistance is represented by three different sectors, categorized by the OECD's creditor reporting system, targeting economic infrastructure, production sectors and social infrastructure in developing countries. I have not found any previous study with this specific categorical classification of EU aid and FDI. My results show that EU ODA is significant and effective in promoting FDI, but it is difficult to distinguish the separate efficiency of the ODA sectors.

This paper is outlined as follows: Section 2 gives a theoretical background to the analysis and outlines previous research and the perspective of the European Union. Section 3 explains the empirical method, the variable components and presents the general model. Section 4 presents the regression results. Section 5 provides a discussion and analysis of the regression results, followed by concluding remarks.

2 FDI Theory for Developing Countries

An overview of the theories of FDI relative developing countries will be presented here. The theoretical background together with previous research will constitute the theoretical framework for this investigation, setting the premises for the FDI-determinants used in my regression. First I will explain the purpose of looking at FDI as a valid channel for official development assistance (ODA) in the context of FDI theory. I will then account for different FDI-theoretical approaches to set a background to the FDI determinants. Next, previous research in aid-FDI is presented. And lastly, I will discuss the relevance of looking at EU in this context.

2.1 FDI as a Resource in Developing Countries

The effect of foreign aid in developing countries is subjected to disagreements among empirical aid researchers. Traditionally, such research looked at the impact of aid on economic growth. Why then, do we care about the aid effect on foreign direct investment? FDI theory suggests that there are positive attributes associated with FDI-inflows to developing countries and that FDI in developing countries constitute a source of capital, technology and knowledge. FDI can bring about industrial upgrading, by creating knowledge spillovers to other sectors than first targeted (Dunning & Narula 2000, 148-149). Foreign direct investment has also been suggested to be the *most* efficient option for developing countries to catch up in their industrial upgrading process due to the following reasons. First, developing countries have limited domestic capital and acquiring technical knowledge and organizational know-how is expensive. Second, firms are more inclined to keep control over their competitive advantages thus making it difficult for a developing country to enter a firm specific sector. Third, policies of infant industry protection are being limited by the World

Trade Organization's framework. Fourth, "the complementary resources necessary to support a viable and strong domestic sector are usually capital and knowledge-intensive" and are therefore out of bounds for developing countries (Dunning & Narula 2000, p. 149).

Another positive aspect of FDI is that, relative financial flows such as different forms of debt finance, e.g. official lending, bond- and bank finance, FDI is an equity finance form of financial flows. A multinational corporation in a host country will expect a repayment on its investment as a share of the production net returns. From a host country's perspective the implication is, that while debt finances require fixed repayments as agreed, foreign firms engaging in direct investments partakes in the host country's economic climate and shares its risks, thus leaving the developing country less vulnerable of repaying loans in difficult economic times (Krugman & Obstfeld, 2009 p.632).

Furthermore, a large part of development policies today is that of investment, and their purpose is to improve returns on investments to poor countries. To facilitate and encourage FDI inflows to poor countries is therefore in line with such policy measures, not the least within the EU (Te Velde 2006 p.4). To sum up, the possible positive attributes of FDI on economic development for a developing country are plentiful.

2.2 Theoretical Framework for FDI Determinants

It is useful to here present some of the foundations of FDI theory and FDI theory's current status relative developing countries to set the framework for FDI determinants. This presentation derives from articles and studies focusing on FDI to developing countries. I will first present the different ways to approach FDI theory and then derive their common ground to explain my use of them.

The different FDI-theoretical approaches usually consider FDI as being resource seeking-, market seeking- or efficiency seeking- FDI, and the relative importance of the FDI determinants may differ depending on type FDI (Nunnenkamp, 2002, p.19). This is taken into consideration in the analysis. There are different ways to categorize FDI-determinants. In the

literature the different approaches are often interactive. Push and pull factors constitute respectively external- and internal determinants to FDI. A similar categorization is that of host country factors, home country factors and international factors, where host country factors include attributes to attract FDI, i.e. pull it in, e.g. market size and growth, economic fundamentals such as human capital and infrastructure, technology, natural resources, trade, economic and political governance. Macro-economic factors are considered to be the “basic economic pull factors” (te Velde 2006, p. 12), and are generally accepted as a base for FDI determinants (although there is still disagreements of their statistical significance). However, these variables can also be enhanced by FDI. Home country factors (the country of the investing firm) include support to economic fundamentals and institutions, e.g. in the form of aid, to the host country. Other home country factors include support to reduce risks in investment projects and similar policies facilitating investments abroad. International factors are subjected to international agreements: bilateral, regional or multilateral (te Velde, 2012 and te Velde, 2006).

A well-known and much used FDI-explanatory tool is that of Dunning (2000) who in his OLI-paradigm (Ownership- Location- Internalization) accounts for the determinants of FDI flows. In short, the aspect of ownership specific advantages considers competitive advantages in a multinational corporation. Internalization considers commercial benefits in an intra-firm relationship. Location concerns location specific advantages (Dunning & Narula, 2000, p. 142). This study focuses on location specific factors, equivalent to host country measures.

The premises for developing countries in attracting FDI have shifted over the last two decades: In the 1980s and 1990s the quick development of new technologies, especially within the information and computer technologies (ICT's), together with economic globalization created interdependence across countries. The now general accepted view of FDI as a promoter for economic growth is quite new and previous theory questioned FDI's impact on developing countries, supplying them with “inappropriate technology” and being “unhelpful” (Te Velde 2006 p.4). A most important outcome of this shift and the new attitude to FDI in developing countries is that their governments have come to recognize that they can actively impact their attractiveness to foreign investment through economic and FDI-specific policies. Theory suggests that countries less stable receive less FDI, and developing countries have increasingly started to create business friendly climates and ridding trade obstacles (te Velde, 2006, p. 4, 10). Rich countries, on the other hand, are somewhat restricted in their

policy-making to create business-friendly environments in a developing host country (Mayer, 2006, s. 9-10). This is also a reason why FDI research in this field is more inclined to use host-country determinants to FDI than looking at home country factors.

All above theories accept this shift of FDI premises. In the perspective of OLI-paradigm, as in host and home countries and in the light of resource seeking-, market seeking and efficiency seeking FDI. Resource-seeking FDI seems to have declined, arguably due to natural resources constituting a smaller share of world output, and possibly because this industry is managed to a lesser extent by FDI (Nunnenkamp p.21, 2002). Moreover, in many developing countries, market-seeking FDI along with more liberal and less protective trade policies have given foreign firms the option of exporting to, rather than investing in, the host market. Thus investors demand for close market access has declined. However, with an expanding service sector it is unclear how market-seeking net FDI is ultimately affected. Finally, efficiency-seeking FDI is motivated by increased competitiveness among firms and is determined by cost, productivity and business facilitation (Nunnenkamp p. 24, 2002).

From an OLI-perspective, the shift in FDI premises for FDI inflows to developing countries have come to create a bargaining situation between the location specific advantages of the host country and the ownership specific advantages of the foreign firm. Thus, the *level of development* in the host country determines what sort of FDI the country will receive (Dunning & Narula 2002, p.144-145). For example, developing countries at an early stage of development are more inclined to attract resource-seeking FDI while more developed developing countries attract asset-augmenting FDI (Dunning & Narula 2002, p.150). This in turn leads to a more fragmented production process, where different parts in the manufacturing line occur in different countries (te Velde 2006, p.8.) The location specific bargaining condition thus creates incitements to governments in developing countries to adjust policy for FDI attraction. It is in within the location specific factors that the core of this analysis is formed.

The changing premises for FDI flows to developing countries makes analyzing FDI flows in a larger empirical and macro-economic perspective more advanced. Not least is access to well defined and accurate data measurements a problem. This study approaches FDI-theory through host country measures and specifically macro-economic determinants, traditionally also used in previous research presented below (section 2.3). Aid is thus a push-factor for

FDI, but not necessarily that of the home country. Moreover, if aid is subjected to rent-seeking activity, its categorical classification becomes increasingly unclear. Also, much of the previous research on the topic aid – FDI uses a theoretical explorative approach.

To sum up, the theoretical framework of FDI is grounded in macro-economic determinants of the host country and firm-specific factors of the home country. As FDI is becoming an increasingly interesting channel for economic growth, new research is more nuanced and layered and is considering aspects of FDI facilitation from a host country perspective. All theories suggests a shift of FDI flows from resource seeking to more efficiency seeking, hence leaving a developing country in a bargaining situation where governments may facilitate the attraction of FDI through policy. By distinguishing sectors or areas where aid may in fact support a developing country's attraction for foreign investment flows, aid invested sensibly could help attract FDI, and possibly find an effective channel to economic growth.

2.3 Aid and Foreign Direct Investment: Previous Research

It is often pointed out in this field that too little research has been made on the subject of aid and FDI, that results are contradictory and that little consensus exists among researchers. Most research is looking at the effectiveness of aid and FDI respectively on growth. Nevertheless, the general opinion or perhaps wish, is that aid will have some sort of catalyzing effect on foreign investment. I will here present some of the previous research published on aid effectiveness on foreign direct investment.

In Alesina and Dollar's "Who Gives Foreign Aid to Whom and Why?" (2000), the authors investigate the pattern of allocation of foreign aid. They find that: while foreign aid responds more directly to "political" openness such as democratization, FDIs respond more to "economic" openness such as improvement in policy management, trade liberalization, better protection of property rights" (Alesina & Dollar 2000 p. 34). Also they conclude that there does not seem to be any mutual dependence between bilateral aid and private flows. In

contrast to aid allocation, private flows does not necessarily require good democratic institutions, but rather good economic conditions (Alesina & Dollar, 2000, p.56).

Karakaplan, Neyapti and Sayek (2005) investigates whether ODA generates sufficient effects to attract foreign direct investments to the aid receiving country. They empirically test their hypothesis that countries that receive aid are more likely to receive FDI, especially in cases of good governance and financial market development. Their results show that FDI does not necessarily flow to countries receiving aid. Both confirming and contradicting the results of Alesina and Dollar, Karakaplan et. al. conclude that good governance and stable economic markets is more of a catalyzer for the positive effects of aid.

Harms and Lutz investigates whether developing countries that received a larger volume of aid attracted more private foreign investment in the 1990s (Harms and Lutz, 2006). They make the assumption that developing countries with healthy institutions will benefit from aid on private foreign investments. In their analysis they add variables for quality of government. Interestingly, their results show that the relationship between aid and private foreign investment is significantly positive for developing countries whose government have a low capacity to implement “sound policies” and that the marginal effect of ODA on private foreign investments is strictly close to zero for developing countries with average institutional characteristics (Harms and Lutz 2006 p.774, 776). In contrast to Karakaplan et al., they conclude that the catalyzing effect of aid is stronger in the developing countries with unhealthy institutions.

Kapfer, Nielsen and Nielson tests whether infrastructure aid leads to an increase of FDI. They find that although aid in general has no statistically significant effect on FDI inflows, aid directed towards infrastructure does. They also emphasize the need for more research on the relationship of FDI and aid (Kapfer et. al. 2007).

Kimura and Todo (2009) investigate whether and how foreign aid facilitates foreign direct investment. They use a gravity equation type estimation, pairing up recipient and donor countries. They are looking at the vanguard effect in particular: whether a donor country’s aid to a recipient country increases the recipient country’s FDI inflow from that same donor country in particular, but not from other countries. They distinguish between two types of aid: aid for infrastructure and aid for other purposes. Kimura and Todo do not find any significant

effect of aid on FDI in general, but in the case of aid from Japan they do find a vanguard effect (Kimura & Todo, 2009, p.482-493).

Selaya and Sunesen attempt to apply a theoretical model to the ODA-FDI relationship using the Solow growth model. Their study splits the total flow of foreign aid into two categories: aid invested in complementary factors and aid invested in physical capital. This approach is used to demonstrate that aid invested in complementary factors (such as investments in human capital and infrastructure), taking into account scale effects, will increase the marginal productivity of capital and thus attract more FDI, while foreign aid invested in physical capital may crowd out private, foreign investment. The results of the regression analysis showed ambiguity of aid on FDI; that the composition of aid matters; and that the net effect is small but always positive (Selaya & Sunesen, 2012).

These studies all use general FDI-theoretical approach in their models and include a set of what has become a standard of macro-economic variables, although such standard has never shown any general accepted statistical significance. As the literature and previous research is vaster in the field of aid-growth than aid-FDI, when required or assumed sensible, theories of the former will be applied on the latter. The new generation of research on aid effectiveness is characterized by a narrower aid-variable, focusing on short-term effects of aid and alternative measures of development to economic growth (Roodman, 2007, p. 7). In such a climate I feel that the approach of this analysis is up to date and current.

2.4 The EU, Aid and Foreign Direct Investment

This study aims to distinguish specifically *EU* ODA effectiveness on FDI inflows. I will here explain the purpose of and background to this distinction and also look at some current facts of ODA sector flows.

The Millennium Development Goals (MDGs) were introduced to achieve the principles and priorities for “inclusive and sustainable development” of the Millennium Declaration, a declaration concluded by the UN in the year of 2000 (EU, p. 12, 2013). The European Report on Development (2013) maintains that the success of the Millennium Development Goals can

at large be credited to the European Union. At the same time, the report finds it difficult to establish a causal link between "aid" and "MDG progress" at all (EU, 2013, p. 46).

The European Report on Development emphasizes the need to switch focus to more inclusive and sustainable aid in the post-2015 global framework for development. They refer to it as "go beyond aid". For example the EU report states, "Levels of ODA should be maintained and ideally increased and ODA should be allocated in ways that optimize its impact" (EU, 2013, p. 208) Also, foreign direct investment (FDI) and other financial flows should increasingly be supported. The EU report argues that the main way to increase income and living standards in low income countries and least developed countries is by expanding investment capabilities and trade, hence reducing these countries' ODA dependence. The EU report pushes to go "beyond aid", and holds that creating enabling environments for sustainable growth should be focus in the post-2015 policies (EU, 2013, p 168-169).

Simply said: aid needs to go where it can promote sustainable development. Problem: No one seems to have the answer of where such aid should be directed to do so. That is why this study investigates the effects of aid on FDI: FDI has been argued to be a factor in promoting economic growth. If a relationship between ODA and FDI can be established, we also have an indication of where to put resources of future policies. FDI can "provide resources that can be used to build physical capital thus directly enhancing the productive capacity of recipient countries" (EU, 2013, p. 146). In addition, local skills as well as technological knowhow, enhanced competitiveness may be improved (EU, 2013, p.146). For these reasons and more, the European Report on Development suggests that the post-2015 development agenda integrate investment policy in development strategy and investments should be made where "growth, productivity and structural transformation" can be encouraged (EU, 2013, p.167).

The European Commission Communication emphasizes how developing countries, in most need of FDI, have been overlooked by EU investors and that more initiatives should be considered by the EU to improve this condition. One measure proposed is to blend loans and grants to enforce and prolong strategic investments, thus improving the business environment in the host countries (te Velde, 2012). The effectiveness of such an approach to boost private flows into developing countries has been questioned. As te Velde (2012) sums up: "If the profitable project is not there, no amount of investor protection will lead to more FDI" and advocates for a "pull" rather than a "push" approach. That is, rather than focusing on the

facilitation for foreign investments in developing countries, EU should focus on how to make developing countries profitable for foreign investors. This relates nicely to this analysis on how different compositions of EU aid effect FDI.

Besides a shift over the last decades in FDI flows there has also been a shift of ODA flows. Aid projects more and more target public sector reforms e.g. fiscal transparency, civil service, legal- and judicial systems, anti-corruption etc. (Karakaplan et al. p. 4, 2005). In this analysis these types ODA flows are represented foremost by the official development assistance targeting the social infrastructure. In fact, this shift of ODA donor preference has, in a steady rate, tripled the amount of ODA to social infrastructure over the last two decades and now amounts to 40 percent of total world ODA (Akramov, 2012, p.2). In contrast, ODA to productive sectors declined between 1995 and 2007 and ODA to economic infrastructure fell from 23 percent of total ODA 1995 to 12.3 percent eight years later (UNDP 2013, p168-170). It might be worth mentioning however, that even though an increase in ODA related to sectors that are highly interlinked with democratic characteristics, it is not necessarily democratic characteristics that determine the direction of FDI flows. Rather, the willingness of receiving countries to adjust such administrative sectors may in fact be just another way of ODA rent seeking (Alesina & Dollar, 2000). Nevertheless, when such improvements are implemented and successful the business climate will also be improved, not only for FDI but also for domestic investment.

3 Method

As it is difficult for governments in developing countries to have a say regarding firm-specific factors, this study will take form around FDI theory regarding location-specific factors i.e. host-specific factors in accordance with Dunning & Narula, 2000; Nunnenkamp, 2002; Karakaplan, 2005; te Velde, 2012; and Mayer, 2006 and the European Development Report 2013. I will in this section present the empirical strategy, included variables and model used to investigate whether EU aid shows any short-term effect on foreign direct investment in developing countries and if it is possible to distinguish what kind of EU aid is most effective in doing so.

3.1 Empirical Strategy

To study the effect on FDI from EU sectorial aid I perform a panel data regression analysis on 59 developing countries. I use a fixed effects model and the ordinary least squares (OLS) estimator for my regressions. Panel data has the good quality of being able to capture factors in regressions that are unobserved, unmeasured and/or variables that could cause omitted variable bias if excluded from the regression (Dougherty, 2011, p.515). I will assume that possible unobserved effects are time invariant. For example, it is reasonable that a country in its initial state has some factors (cultural, economic etc.) uniquely attributed to that specific country. A fixed effects¹ approach can capture such country specific effects by providing a dummy for each specific country which is constant over time. I conveniently use Eview's cross-section fixed dummy variables for this reason. I also add period-fixed dummy variables to capture possible shocks in time constant over cross-sections. I am aware that a fixed effects model with a dummy variables for each country and year will generate many more explanatory variables and therefore most likely generate high R^2 values, possibly overstating the regression explanatory power (Wooldridge, 2006 p.490). Therefore the estimated results

¹ A fixed effect model is also used in Alesina and Dollar, Hansen and Tarp, Kapfer et. al. and Selaya and Sunesen.

are interpreted with caution. For most variables I assume a non-linear relationship to my dependent variable FDI (according to new generation of research on aid), and concerned variables are therefore transformed using logarithmic transformation, to obtain linear relationships. All logged regressors have a prescript of lg.

Because panel data comprise both time series and cross-sections it is most likely subjected to both heteroskedasticity and serial correlation which may cause my OLS estimator to be inefficient but also give misleading interpretations of the regression coefficients (Dougherty 2011, p. 283). Although there is a risk that my OLS will be inefficient when dealing with arbitrary serial correlation and heteroskedasticity, it is accepted to use OLS with robust standard errors, since other methods require that we know the form of heteroskedasticity and serial correlation (Wooldridge, 2006, p.434). I try to overcome these issues as follows: I use White's standard errors and covariance to generate robust coefficient standard errors compatible with heteroskedasticity of unknown form (Wooldridge, 2006, p. 272). I use differencing transformation in hope to eliminate serial correlation² (Wooldridge, 2006, p.431). (The results from the Breusch-Godfrey tests are presented in the appendix.)

Another problem with panel data is non-stationarity which might cause standard inference to be inappropriate. A test is performed for unit root for all variables included and a difference transformation is performed to correct non-stationarity where necessary and possible. The difference transformation is also a tool to correct potential serial correlation. All regressors that have been differenced have the prescript d (follows that a logged and differenced regressor shows the prescript dl). All variables are presented more explicitly in section 3.2.

The sample consists of 59³ countries on the OECD's DAC-list of recipients. They are classified as low-income or middle-income countries. I use yearly data from 1995-2012. Some countries have been excluded due to lack of data and the panel is unbalanced. The total time period for this regression spans over 18 years 1995-2012, rendering a possibility to look at short-term effects only. I use short-period panel data in accordance with Clemens et al. (2004).

² Endogeneity is another issue when handling this sort of panel data. Other estimators are often recommended in literature on the topic to correct this issue. However, this is out of the scope of this paper.

³ A list of countries included can be found in the appendix

3.2 Variables

I have restricted my determinants to match the macro-economic literature presented previously. I choose to leave out determinants such as democracy, institutional quality and colonial ties, partly because accessible data lacked observations for the given years and also, these determinants have not shown any conclusive significant effect in previous research. The source and a short description of each variable can be found in the appendix.

3.2.1 Dependent variable, FDI

My dependent variable is net FDI-inflows from the World Bank Indicators statistic database, and is measured as net inflows in constant price, US dollars. Net FDI-inflows differs from, and compose a better measurement than net FDI, which consist of gross inflows of FDI, less domestic investment abroad. Net FDI inflows show the flows of foreign capital into a country “regardless of that country’s capability to invest abroad” (Kapfer et al. 2007)⁴. I have not distinguished between EU FDI-flows and FDI-flows from other investors, since I hope to determine if EU ODA have any total effect on FDI-inflows to developing countries. My FDI-variable is logged and shows no unit root in this state.

3.2.2 Key Independent Variable, ODA

My key independent variable is official development assistance ODA, the most used indicator of aid flows in research. The purpose of ODA is the economic development and welfare of developing countries. It includes official financing flows to developing countries on the Development Assistance Committee’s recipient list (the DAC recipient-list). The donors constitute 34 OECD member countries, the EC and a few others volunteering their data. Noteworthy, ODA statistics measure the outflows of money from a donor country and not the

⁴ FDI-flows compose the net sum of capital equity, reinvested earnings and intra-company loans. If one of these components is negative and it outweighs the sum of the other two components, the net inflow of FDI will be negative (World Bank 2014).

money received by a developing country. EU ODA comprises the EU's collective ODA, i.e. the sum of ODA reported by the EU member states and the additional ODA provided by EU institutions (European Commission, 2013). Official assistance constitutes grants and loans, however loans must be concessional in character with a grant element of at least 25 percent (OECD, 2014). All my ODA statistics are taken from the OECD Creditor Reporting System database (CRP) and are given in constant prices \$US.

Sector ODA

In OECD's creditor reporting system, Official Development Assistance is categorized sector wise: "A sector or main purpose category (e.g. health or energy), defines the main economic or social infrastructure categories, which an individual activity is intended to foster" (OECD's Creditor reporting System). Data is available for sector classification from 1995, but only for ODA *commitments*. From 2002 there are sector classifications for ODA *disbursements*, which is money that has left the donor. ODA *commitments* are a "firm written obligation by a government or official agency, backed by an appropriation which is reported in the year in which it was made" (Aidinfo, 2013). Disbursements are the most accurate measurement, since it is money that has not only been promised, but actually sent. However, since there is no available data from 1995-2001 on disbursements, I will use the data on commitments instead. This method is used in previous research since "the share of aid disbursed for a broad category of purposes generally reflects the share of aid committed for that broad category of purposes" (Clemens et al. 2004 p. 14). Clemens et al. (2004), has tested this relationship by checking the correlation between the proxy and the true value as fractions of total disbursements and found it reliable (Clemens et al 2004 p. 15). ODA commitments will therefore act as a proxy for disbursements between the years 1995-2001 in accordance with Clemens et al. (2004) and also Selaya & Sunesen (2012). In this paper, I have chosen to delimit the ODA sectors used in my regression to the following three: Social infrastructure ODA_{soc}, economic infrastructure ODA_{eco} and production ODA_{pro}. Table 1 shows what the intended target is for the sector ODA-variables.

Table 1. Sector ODA specification

Variable	Targeting	Including
ODAsoc Donor: EU	Social Infrastructure and services	Education, health, water supply & sanitation, government & civil society (conflict, peace & security), other social infrastructure & services
ODAeco Donor: EU	Economic infrastructure and services	Transport & storage, communications, energy, banking & financial services, business & other services
ODApr Donor: EU	Production sectors	Agriculture, forestry & fishing; Industry, mining & construction; trade policies and regulations; tourism
ODAr Donor: total donors less EU ODAsoc, ODAeco & ODApr	ODAsoc + ODAeco + ODApr from other donors than the EU + total ODA spent on other sectors	Multi sector/Cross-cutting (general environment protection), commodity aid, action relating to debt, humanitarian aid, administrative costs

The time span I am investigating is relatively short and the effectiveness of aid on growth may require a long period of time to be distinguishable. Therefore, aid flows generating a general effect on national growth, such as aid directed towards environment protection, will not be of interest in this study since they will only potentially affect FDI in a long-run scenario. However, I still chose to include these measures in the total ODA variable to make sure that any effect from ODA on FDI is not omitted. Regarding ODAsoc, this sector targets potentially long-run effects such as health and education, anti-corruption and democracy. I therefore suspect that this variable will not give me any significant results due to the short time-span investigated. ODAeco is targeting sectors that could potentially have a more immediate effect on FDI for example transportation and communication. I therefore expect this variable to be positive and significant. ODApr is targeting sectors of production. It should therefore be significant. But the effect of this sector is ambiguous: it could complement FDI-seeking activity and act as an agglomeration magnet, but it could also cause rent seeking and crowd out FDI. All ODA-variables are logs and in this status they show no unit root.

3.2.3 Control variables

Economic development

The majority of empirical papers reviewed in this analysis have included some form of GDP-variable as a measure of level of development or market size. I will use GDP per capita (GDPcap) in accordance with Kimura and Todo (2010), Hansen and Tarp (2000) and Karakaplan et. al. (2005), GDP per capita is also a measurement for the initial level of development in each country and thus a proxy for time-varying initial conditions in each country (Selaya and Sunesen, 2012, p 2157). GDP per capita is logged and show no unit root in this state.

GDP Growth

As another pull factor I will include GDP-growth (GDPgr) as a measure for market size. It is likely that investors are attracted to markets that are growing rapidly, and hopefully this variable will also in a short run show to be significant and positive. Also, GDP growth is a measurement for business cycles. I use GDP-growth in accordance with Karakaplan et al. and Kapfer et al. The variable shows no unit root and is therefore not manipulated.

Openness

I use as a measurement for openness the sum of imports and exports divided by GDP representing trade (TRDgdp). This is a determinant representing general policy of a developing country where a higher value indicates a friendlier climate for foreign firms, e.g. less red tape, hence constituting another pull factor for FDI inflows. However, the explanatory force of trade on FDI has been challenged. For example, even when trade barriers and red tape restrict trade, firms attempt to circumvent them. As mentioned earlier, this in particular has been the case in countries with vast natural resources. Also the relationship can be endogenous, where FDI have an effect on trade (Moosa, 2002, p.5). Moreover, FDI is mostly invested in sectors of trade. If aid increases the supply of traded goods, thus lowering the price relative non tradable goods, aid may discourage FDI (Kimura & Todo, 2009, p.484). As a measure for openness, I suspect this variable to be positive and significant. This variable is included as well in Karakaplan et al, Harms and Lutz, and Kapfer et. al. My variable is logged and differenced to avoid non-stationarity.

Competitiveness

The exchange rate affects the wealth of multinational corporations (MNCs). When a host country's currency is depreciating, FDI in the country has shown to increase (Karakaplan 2005, p.7). A company's will to invest abroad may act as a substitute for export in that FDI "hedge economic exposure to foreign exchange risks" (Moosa, 2002, p. 45). However, it is not only the fluctuations in the exchange rate that are of interest when measuring international market competitiveness, so are cost and price trends. One way to capture this competitiveness is the use of the nominal effective exchange rate deflated by nominal unit labor costs. This real effective exchange rate (REER) becomes a measurement of a host country's competitiveness and is expected to have a negative relationship to FDI since a rise in the REER-index indicates a loss in competitiveness. Since exchange rates may fluctuate it provides a good short-term measure for foreign investors will to invest. This variable is also included by Karakaplan et al., Harms and Lutz, and Kapfer et al. This variable is logged and differenced.

Inflation

As a measurement of macroeconomic stability, I add inflation rate to the regression. Karakaplan et al. and Harms and Lutz also include this control variable. Inflation (INFL) shows the rate of price change in a country as a whole and uses the annual growth rate of the GDP implicit deflator. A high inflation⁵ is a sign of economic instability and I expect this variable to have a negative relationship to FDI and the coefficient to be negative. This variable is not transformed in any way and is stationary.

Savings

Selaya and Sunesen explain how a high level of domestic savings lowers the need for foreign capital (2012, p. 2157). This would mean that savings do have an effect on FDI and that it is negative. I will include gross domestic savings as % of GDP (Sgdp). This coefficient could capture a possible crowding out effect and is expected to be negative in the regression. I am unsure of the effect of this variable. It could also show the level of development since more savings indicates more potential private investment. The variable is logged and differenced

⁵ Looking at the residuals I found some irregularity in their normal distribution. When investigating the data closer, the Democratic Republic of Congo showed immense hyperinflation during the years of civil war 98-01. These observations have been excluded from the analysis.

and show no unit root in this status.

Human Capital

Human capital is often brought up to be a determinant of FDI. A common measure for human capital is education. I use gross enrollment ratio to secondary education to try to capture human capital (SCHOOL). I hope this variable show to be significant and positive although its effect might require a longer time period to show any effect. My original variable shows non-stationarity and is therefore differenced.

Employment

I have not found any previous research using employment as a determinant of FDI. My reasoning is that in a higher level of employment is embedded economic stability and more human capital than in a lower level of employment. Therefore this should be a pull-factor for foreign firms. Also, agglomeration effects are considered to be FDI-pull factor, and high employment indicates more business activity. Therefore, the employment coefficient should turn out positive and significant. The measure consists of employment to population over 15 years old ratio, in percent (EMPL). This variable is both logged and differenced.

FDI Facilitation Policy

This measurement shows the ability of governments to formulate and implement sound policies and regulations that permit and promote private sector development and is therefore in the category of FDI policy (POLITY). This variable is an index and not transformed.

Natural Resources

Natural resources are another possible FDI location-specific determinant. As discussed above, FDI flows to developing countries are changing course from resource seeking- to alternative seeking activities. However, this shift is interlinked with the *level* of development in a country. Less developed countries are more inclined to attract resource-seeking FDI. Especially export driven FDI is dependent on the location-specifics of natural resources and investors claim to natural resources may in fact outweigh country risks and trade barriers (Kapfer et. al, 2007). To capture this effect on FDI, I use the variable natural resource depletion (NR). Simplified, natural resource depletion constitutes the ration of the value of forest-, energy- and mineral depletion to the remaining reserve lifetime of each resource. It includes coal, crude oil, natural gas, gold, silver, copper and more and is presented as percent

of GNI. This variable is used as a proxy to capture the natural resources attracting FDI and I expect it to be positive. My variable is logged and differenced.

Infrastructure

It is suggested in FDI literature that FDI is determined by business facilitation and level of infrastructure. I propose a variable to capture a level of a country's technology and advancement in business facilitation: infrastructure measured as electric power consumption kWh per capita (POWcap). Electric power consumption measures the production of power plants and combined heat and power plants less transmission, distribution, and transformation losses and own use by heat and power plants. The variable is logged and differenced.

Population

I add population in my regression as a control for country size (POP). Forms of population measures are included in Kapfer et al. and Selaya and Sunesen. This variable is logged.

3.3 Model Strategy

The model for analysis is divided into two steps. The purpose of the first step is to see if any significant relationship between the three ODA sectors combined and FDI exists. I run the first regression on FDI with all control variables. In accordance to previous research it is reasonable to assume that changes in foreign direct investment are affected by conditions also prior to current effects. Although I am interested in a short-run scenario, I include one lag for each explanatory variable to follow praxis. Lastly, I specify my model. The general regression specification model for step 1 is:

$$(1) FDI_{it} = \beta_1 ODA_{it} + \beta_2 X_{it} + \alpha_i + \epsilon_t + u_{it}$$

where FDI is total FDI inflows, ODA is a EU ODA, X represents a vector of control variables, α is a time invariant country fixed effect, ϵ is a time dependent fixed effect for country i and year t , and u is the disturbance term assumed to possess the usual desirable characteristics.

The purpose of step two is to separate the possible effects of sector ODA on FDI, determine their separate effects and test the sensitivity of the results. I run the regression with separated ODA sectors (ODAeco, ODApro and ODAsoc) and their lags. The general regression specification model for step 2 is:

$$(2) FDI = \beta_1 ODA_{eco_{it}} + \beta_2 ODA_{pro_{it}} + \beta_3 ODA_{soc_{it}} + \beta_4 X_{it} + \alpha_i + \epsilon_t + u_{it}$$

I then perform three sensitivity tests. The first sensitivity test tests the efficiency consistency by eliminating the highly correlated ODArest. High correlation between explanatory variables makes it difficult to distinguish explanatory effects, because one explanatory variable may capture the effect of another. The second sensitivity check tests the robustness of my results without fixed effects but with weighted least squares. As mentioned in section 3.1, I include White's robust standard errors in my fixed effects regression, but I have not however, corrected for heteroskedasticity in my variables. Although I cannot specifically identify the form of heteroskedasticity it is assumedly better in strong cases of heteroskedasticity to use the wrong form in combination with weighted least squares than no correction using OLS (Wooldridge 2006, p. 289). Fixed effects dummies are not compatible with this method and I therefore have to take into consideration omitted variables bias. The third sensitivity test tests the sensitivity of my variable specification. I do this by exchanging my dependent and explanatory variables from constant prices to prices per capita and excluding population as a control for country size. A complete presentation of each regression specification is presented in the appendix.

Through this strategy I hope to make some conclusions regarding the effects of EU ODA targeting economic infrastructure, production factors and/or social infrastructure on FDI, and thus providing a step towards EU future policy on aid flows.

4 Results

This section presents the results of this investigation, explained and commented in short. The results and sensitivity checks are presented in the order of the two steps performed.

4.1.1 Results: Step 1

The purpose of step 1 is to see if the combined effect of ODAeco, ODApro and ODAsoc is significant and to specify my model. My first regression produces statistically significant ODA variables (Table 2, Regression 1). The ODAsec coefficient implies that one percent increase in EU ODA targeting economic- and social-infrastructure and production factors will generate a 0.18 percent increase in foreign direct investment inflows. Also several of my FDI determinants turn out significant, generally with the expected sign. One exception is POWcap indicating that this proxy is missing its true measurement-purpose of infrastructure.

As I add lags in Regression 2, the explanatory power of my coefficients tends to decrease (Table 2, Regression 2). Not many lagged variables come out significant and few of the standard FDI determinants hold any statistical significance at all in this regression. Also lagged variables remove many of my observations. Still, my R^2 value is showing a questionable high explanatory power. A high R^2 value is expected when using fixed effects model because the fixed effects model includes dummies for country AND time specific effects creating a possible over-specified model. Consequently, much of the variation in the data is explained (Wooldridge, 2006, p.490). Although many of my control variables fall out of statistical significance, ODAsec and ODArest stays significant at 10 percent probability level. However, lagged ODA surprisingly does not show any significance.

Table 2. Results of step 1. OLS estimator with fixed country and time effects. White robust errors. Dependent variable: LGFDI.

	Regression 1		Regression 2, with lags		Regression 3: specified	
Observations	483		404		776	
Variable	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
C	-6.101	7.129	-12.807*	7.036	-13.456***	2.995
LGODASEC	0.181**	0.084	0.193*	0.110	0.101*	0.059
LGODAREST	0.152**	0.074	0.125*	0.070	0.146**	0.059
LGGDPCAP	1.427***	0.314	1.307	1.205	1.329***	0.127
GDPGR	0.029*	0.019	0.037**	0.017	0.026**	0.013
INFL	-0.008*	0.004	-0.003	0.008	-0.008**	0.003
DLGREER	-0.319	0.428	-0.084	1.147	-0.473	0.420
DLGNR	0.173*	0.094	0.205**	0.095	0.024	0.042
DLGSGDP	0.230**	0.098	0.080	0.130	0.026	0.094
DLGTRDGDP	0.320	0.453	0.306	0.393	0.269	0.342
DLGPOWCAP	-0.466	0.591	-0.807	0.907	x	x
DLGEMPL	2.390	1.588	2.964	2.071	x	x
POLITY	-0.018	0.043	-0.004	0.059	x	x
DSCHOOL	0.008	0.013	-0.003	0.021	x	x
LGPOP	0.149	2.228	3.720	17.59	2.704***	0.825
GDPGR(-1)	x	x	0.037	0.015	0.025***	0.007
DLGSGDP(-1)	x	x	-0.432***	0.159	-0.038	0.092
DLGPOWCAP(-1)	x	x	1.062*	0.546	x	x
LGODASEC(-1)	x	x	0.089	0.116	0.118*	0.060
LGODAREST(-1)	x	x	-0.020	0.055	-0.036	0.046
DLGTRDGDP(-1)	x	x	0.342	0.516	0.721***	0.241
LGGDPCAP(-1)	x	x	0.100	1.217	x	x
DLGREER(-1)	x	x	0.046	0.487	x	x
INFL(-1)	x	x	-0.001	0.005	x	x
DSCHOOL(-1)	x	x	0.007	0.016	x	x
LGPOP(-1)	x	x	-1.649	17.07	x	x
POLITY(-1)	x	x	0.013	0.038	x	x
R2-value	0.900689		0.912545		0.896365	

Significance levels: * p< 0.10; ** p<0.05; *** p<0.01***

To restrict my model and come to terms with possible over-specification, the following variables are excluded. Human capital (SCHOOL), FDI facilitation policy (POLITY), employment (EMPL) and infrastructure (POWcap) have not shown any significant results in my two regressions. For the variables SCHOOL and POLITY I suspect their real effect on FDI cannot be determined in the period of time I am investigating. Moreover, my POLITY data suffers from serious lack of observations affecting the total regression result, but also diminishes the true explanatory force of FDI facilitating policies. I eliminate these variables with the assumption that they are captured by time invariant country-specific effects and thus accounted for in my fixed effects analysis (after all I only use a time period of 18 years). Regarding employment (EMPL) and infrastructure (POWcap), their inclusion is more of an experimental proxy to try to capture a country's business activity and level of infrastructure. I try the sensitivity of my POWcap variable by exchanging the proxy to energy use as a measure of kg oil equivalent per capita, but for this exchange my measure stands robustly insignificant. I subordinate to previous research (of which I find none to include these two specific proxys) and exclude them in my specified regression. The intercept in this type of regression model, is an average of the individual-specific intercepts, and show little interpretable information.

Most lags show high correlation to their un-lagged equivalent (for example POP and POP(-1) show correlation of 0.999) which will make it difficult to discriminate between current and lagged effects. I drop lagged control variables with a correlation to current variables of 0.5 and above. The result of this manipulation can be found in Regression 3 which is my specified model.

My specified regression, (Table 2, Regression 3, or appendix regression specification Regression (3)), shows that while some of FDI theory's determinants still holds statistically significant, some have fallen short. GDP per capita and GDP growth are highly positive and significant confirming previous FDI theory. The inflation rate is significant showing a negative relationship to FDI as predicted. The real exchange rate used as a proxy for competitiveness, shows a negative relationship to FDI as predicted, but is not significant. Natural resources show the expected sign, but no statistical

significance. Savings is not significant. Openness (TRD) is not significant, but its lag is (in the literature studied, trade have contradictory impacts on FDI).

Most importantly, ODAsec still shows positive and significant, indicating that a 1% increase in EU sector ODA will increase total foreign direct investment inflows to developing countries with 0.1%. Although the estimated efficiency is somewhat reduced from regression 1, the specified model in regression 3 is more reliable due to the larger number of observations and exclusion of variables causing possible model over-specification. This is also the regression used in the continuous part of the investigation.

4.1.2 Results: Step 2

In this section I present the results of step 2 in my model: distinguishing the effects of the EU ODAeco, ODApro and ODAsoc and the results from their sensitivity checks. Results are presented in Table 4.

Regarding the sector-separated ODA variables, the result shows some difference from my original expectations (for comparison between predicted outcome and actual outcome, table 3). ODA targeting economic infrastructure shows no significant effect on FDI in contrast to my expectations, and ODA targeting social infrastructure does. ODA targeting production sectors turns out highly significant (table 4 (4), “Fixed Effects with OLS and Robust White Errors”). My results imply that a one percent increase in each of EU ODAeco, ODApro and ODAsoc, generates a 0.01, 0,05 and 0,1 percent increase respectively in world FDI-inflows. This shows that ODAsoc contains most efficiency in promoting FDI and that the effect is detectable also in a short time period. All ODA sectors come out positive, indicating that ODApro’s complementary effects outweigh its crowding out effect. It is in respect to this regression I perform my sensitivity checks.

Table 3. Predicted and estimated results of ODAsec variables Step 2.

EU	Targeting	Predicted results	Estimation results
ODAeco	Economic infrastructure and services	Significant. Positive coefficient	Not Significant (0/4). Positive coefficient.
ODApr	Production sectors	Significant. Ambiguous coefficient.	Significant (4/4). Positive Coefficient
ODAsoc	Social Infrastructure and services	Not significant. Positive coefficient.	Significant: (3/4). Positive coefficient

The fraction following "significant:" is the number of times the variable has shown to be statistically significant of the four regressions in Step 2.

The first sensitivity check is a control to see if my estimator coefficients are robust to ODArest exclusion. Since my ODA-variables are quite correlated with one another, and especially with ODArest, the OLS estimator might have trouble separating their different effects. Excluding ODArest show small differences in the results of estimator coefficient magnitude (see table 2 (5)).

The second sensitivity check is a robustness control when correcting for heteroskedasticity. The robust standard errors of fixed effects OLS and Weighted Least Squares OLS can be compared in Table 2 (4) and (6). Since I do not include fixed effects in this sensitivity test, I am aware of potentially biased estimates. For this test, ODAeco have roughly the same estimated coefficient and is still not significant. ODApro is still significant and its effect has increased. ODAsoc is no longer significant and its explanatory effect has dramatically been reduced. The loss of explanatory power when country specific effects are removed, indicates that although there is a positive effect on FDI, the effect cannot be accounted for unless specifics for each country are included. ODAeco stays more or less the same.

Table 4. Results: Categorized ODA-variables and sensitivity checks. Dependent variable LGFDI

	(4) Categorized ODA: Fixed effects with OLS and White robust std. e.		(5) Sensitivity Check Effectiveness; excluding ODArest White robust std. e.		(6) Sensitivity Check GLS Weighted model, no fixed effects, White robust std. e, OLS		(7) Sensitivity Check FDI/cap and ODA/cap, White robust std. e.	
Observations	776		776		776		776	
Variable	Coefficient	Std. E	Coefficient	Std. E	Coefficient	Std. E	Coefficient	Std. E
C	-12.863***	2.806	-12.632***	2.762	-7.407***	0.274	-6.505***	0.853
LGODAECO	0.013	0.018	0.012	0.017	0.011	0.015	0.011	0.019
LGODAPRO	0.045**	0.020	0.058***	0.021	0.067***	0.019	0.046**	0.021
LGODASOC	0.108**	0.049	0.152***	0.040	0.001	0.039	0.096*	0.051
LGODAREST	0.143**	0.056	x	x	0.180***	0.043	0.144***	0.054
LGGDPCAP	1.325***	0.120	1.312***	0.108	1.365***	0.024	1.289***	0.115
GDPGR	0.026**	0.013	0.028**	0.017	0.049***	0.010	0.025**	0.012
INFL	-0.009**	0.004	-0.009**	0.004	-0.001	0.002	-0.009**	0.003
DLGREER	-0.580	0.446	-0.557	0.457	-0.254	0.313	-0.582	0.436
DLGNR	0.031	0.040	0.032	0.043	-0.001	0.040	0.033	0.038
DLGSGDP	0.010	0.093	0.003	0.093	0.120**	0.059	0.021	0.099
DLGTRDGDP	0.225	0.371	0.273	0.389	0.446	0.350	0.229	0.372
LGPOP	2.595***	0.804	2.695***	0.832	0.664***	0.016	x	x
GDPGR(-1)	0.025	0.007	0.027***	0.006	0.043***	0.012	0.025***	0.007
DLGSGDP(-1)	-0.034	0.093	-0.031	0.095	-0.032	0.061	-0.018	0.096
LGODAECO(-1)	-0.002	0.021	-0.001	0.023	-0.022***	0.006	-0.004	0.021
LGODAPRO(-1)	0.038**	0.018	0.035**	0.018	0.029	0.019	0.039**	0.019
LGODASOC(-1)	0.022	0.039	0.021	0.037	-0.069*	0.040	0.015	0.036
LGODAREST(-1)	-0.029	0.050	x	x	0.106***	0.034	-0.019	0.053
DLGTRDGDP(-1)	0.712***	0.255	0.729***	0.268	0.674***	0.207	0.742***	0.250
R2-value	0.897		0.895		0.901		0.847	

Significance levels: * p< 0.10; ** p<0.05; *** p<0.01***

In the third and final sensitivity check I exchange my dependent and explanatory variables from constant prices to per capita measures to see if they are correctly specified. The ODA-coefficients stand fairly robust in significance and in efficiency.

To sum up, the regression results show that EU ODA is significant in affecting FDI inflows to developing countries. EU ODA targeting social infrastructure appears to be the most efficient sector ODA in doing so, but is also least robust through the sensitivity tests. EU ODA targeting production sectors stand positive and robust through all

sensitivity tests. And finally, EU ODA targeting economic factors appears to be insignificant in this model, with a low efficiency coefficient. I will in my next chapter discuss more thoroughly the implications of these results.

5 Discussion and analysis

I have concluded in my study that EU official development assistance is a statistical significant determinant to world FDI, and that the significance for EU ODA targeting production sectors and social infrastructure stands significant in the context of this analysis. I will here provide a more nuanced discussion and analysis of my regression results. I will start by discussing the results of the ODA-variables, in respect to FDI theory and in the light of previous research. I will then shortly discuss the outcome of the control variables in a similar manner. Also, I will address some possible restrictions in the model. Finally, I will shortly mention the implications in setting the new development agenda.

ODA

EU ODA targeting economic infrastructure turned out to be insignificant in all regressions and sensitivity tests. This is surprising since investments in public infrastructure such as energy distribution, road construction and communication improvements, according to previous research, encourage private investment (see Selaya & Sunesen and others). If we for a second leave the statistical significance be, and take a look at the economic significance, EU ODA targeting economic infrastructure turns out to be the least effective in affecting FDI-inflows, which is also surprising. There are some possible economic reasons for this result. As mentioned earlier, the flows of ODA to the developing world has changed from economic targets to more social infrastructure targets over the last decade, which may have lead developing countries to a infrastructural gap (UNDP, 2013 p. 175). In fact, the fall of ODAeco from 23 percent to 12.3 percent of total ODA between the years 1995 to 2003, covers a significant part of the time period I am investigating. This may in fact have diminished the effect of ODAeco's effectiveness on FDI, relative the other sectors. Also, looking at the ODAeco, its composition is quite wide ranging: from close production-related road-construction to the more indirectly linked bank-service sector. As concluded by Selaya and Sunesen, the composition of aid matters. ODAeco may consist of both complementary factors to FDI and crowding out effects. This indicates

that to find the true efficiency of the ODAeco variable, a narrower and perhaps more qualitative study-approach is required, where type of FDI and specific country location advantages is taken more into consideration.

Looking at ODApro, the estimate is consistently significant and positive. This implies that ODA targeting production sectors are an important element in attracting FDI. My pre-assumption for ODApro was unsure, since previous research suggests that financing production with aid will crowd out FDI that could have otherwise been undertaken by private investors. However my results suggest that ODApro in fact is a valid channel for FDI promotion. Also the production sector has had a decline of disbursements on behalf of social sector ODA. This is apparent in the variable's economic efficiency relative ODAsoc. Production sector ODA incorporate agriculture, fishing and mining (among other things) and while ODA increases have been made in industry and mining constructions in the last decade, agriculture and fisheries have stagnated (UNDP, 2013 p.168). To evaluate the true efficiency of EU production sector-ODA will require a firmer classification of recipients and their capabilities towards FDI-motivations.

EU Social infrastructure ODA shows to be most economic efficient ODA sector to FDI inflows. This sector constitutes 40 percent of total world ODA (Akramov, 2012, p.2). It is also the ODA sector that shows the least consistency through the sensitivity checks of this analysis. I expected this variable to show no significance because its components (education, health and good governance for example) are likely to have a long-term effect on FDI and the variable's current effect is therefore not captured here. Arguably, social infrastructure ODA should be highly linked with underlying factors such as democracy, governmental quality, and human capital and could possibly pick up their omitted variables bias. Although this might say something about the importance of such factors to FDI-inflows, it does not necessarily prove that ODAsoc towards policy reforms is effective. This interpretation suggests that ODAsoc does not have any direct impact on FDI-inflows but rather that education, health and government and civil society etcetera do.

Comparing the standard deviation for ODAsoc with ODApro and ODAeco, ODAsoc is relatively lower (1.26 compared to 1.53 and 2.15) implying that the level of ODAsoc is more constant over time and countries and that ODApro and ODAeco are more volatile

over, and less evenly distributed across countries. This in turn suggests that ODA_{pro} and ODA_{eeco} are more sensitive to type of FDI and the level of absorption capacity. The high explanatory power of ODA_{soc} may also be a clue to that whilst ODA_{pro} and ODA_{eeco} are targeting more specific projects and need to be investigated in the light of type of FDI, ODA_{soc} has a more general effect in improving the overall political and economic climate.

I have encountered some restrictions to sectorial EU ODA variables' behavior. First, the ODA variable from 1995 up to 2001 is a proxy. A country's commitment does not have to equal its final disbursements, and it is reasonable to assume that the proxy is overconfident in its values (that the commitment is larger than the actual disbursement). Hence, the effects on FDI may be overstated. Second, although a sector categorization of ODA is in line with current research methods, the sector classifications used by the OECD are still broad. An even narrower breakdown could be beneficial. Third, the ODA variables are correlated, suggesting that their individual effects should be interpreted with care. Fourth, in comparing the different sectors, we have not considered the cost at their destination. Building a road, improving fishery production or reform a policy-making process all have incomparable absorptive capacities in real costs and in the value of their output, which makes it difficult to draw conclusions on their real effectiveness on FDI. This is something that previous literature seems to have overlooked when comparing different sector ODA.

Control variables

GDP per capita and GDP growth are both significant and positive as expected and in accordance, with previous theory, indicating that both present economic level and the prospective level is a factor to consider for investors. The inflation rate and real exchange rate have a negative coefficient as expected. The inflation rate implies that foreign investors are deterred in economic instability. The exchange rate-coefficient shows the effect of losing competitiveness, but is not significant. Domestic saving is not significant in my specified model. Natural resources are not significant in most regressions, and yet have deep theoretical rooting in FDI-theory. However, I am not too concerned, in much of the presented literature, natural resources are not included and when they are, the statistical significance is undetermined. Natural resources do however, show positive correlation to trade, confirming previous theory, that NR is a

determinant for FDI relating to trade. Lagged trade is highly significant indicating that investors invest in respect to previous years' production outcome. The initial state of openness is however not significant but show the expected sign. Trade is significant in most previous research. Ultimately, it may come down to the type of FDI; is it trade-oriented or not. Lastly population is highly significant, but also highly correlated to ODA and FDI. As brought forward earlier, theory suggests that determinants to FDI-flows to developing countries require a nuanced approach. Although I have chosen control variables that are largely concurrent to previous research, many of them fail to stay statistically significant in my model. One explanation can be the relative high variance in the data of developing countries. According to FDI theory, FDI determinants differ vastly depending on the status of the country and the type of firm activity.

Model restrictions

It is commonly noted in panel regression analysis, including a wide range of countries and macro-economic variables over time, that both heteroskedasticity and serial correlation is present (see appendix for Breusch-Godfrey test of serial correlation). I have taken this into consideration using robust standard errors and lags. However, I stay modest to the actual explanatory power of my estimates, recognizing that the OLS estimator has some restrictions handling these issues. I am also aware that the timespan investigated here is quite short and that a longer period may locate more constant patterns over time. However, the shift in the preconditions and the determinants for FDI are a quite recent trend, only about two decades. In such manner, this analysis has a current time perspective.

Policy implications

As FDI has been more and more established as a positive force in development, newer research and theory suggests a more refined approach to the FDI and development relationship, where "type of FDI, firm characteristics and economic conditions and policies" and motivation of FDI are considered (te Velde, 2006, p.4). The European Development Report finds it hard to decisively distinguish the effects of EU ODA. For the EU, in setting a new agenda for development policy, the traditional macro-economic approaches need to be dissected and more qualitative, catching a wider range of characteristics for both FDI and ODA.

6 Conclusion

This paper has studied whether EU aid shows any short-term effect on foreign direct investments in developing countries, and if it is possible to distinguish what sort of EU aid is most efficient in doing so. My results show that aid has a significant effect on FDI. However, when trying to specify what kind of sector ODA is most efficient, I find a comparative analysis difficult. The actual volume of ODA differs vastly between the different sectors; the variability within each sector is wide; there has been a big shift from ODAeco and ODApro to ODAsoc over the last two decades; and cost-aspects, or value added, are difficult to compare. My results show that ODA to social infrastructure is most economically effective, hence indicating that the underlying factors of governmental quality are important for FDI flows. That ODA to production sectors are significant and robust in attracting FDI and that ODA to economic sectors are not significant at all. The last result is arguably a combined effect of a variable to varied and subdued to declining support over the timespan investigated.

As this study has shown, the overall effect of ODA is hard to capture due to the many nuances of both aid and FDI. An even more restricted analysis, separating countries by level of development and potential location specific advantages is needed to fully capture FDI inflows and to empirically have ground for new EU aid policy implementation.

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8 Appendix

Table 5. ODA by Sector specification

I. Social Infrastructure & Services	I.1. Education I.1.b. Basic Education I.2. Health I.2.b. Basic Health I.3. Population Pol./Progr. & Reproductive Health I.4. Water Supply & Sanitation I.5. Government & Civil Society I.5.a. Government & Civil Society-general I.5.b. Conflict, Peace & Security I.6. Other Social Infrastructure & Services
II. Economic Infrastructure & Services	II.1. Transport & Storage II.2. Communications II.3. Energy II.4. Banking & Financial Services II.5. Business & Other Services
III. Production Sectors	III.1. Agriculture, Forestry, Fishing III.2. Industry, Mining, Construction III.3.a. Trade Policies & Regulations III.3.b. Tourism
IV. Multi-Sector / Cross-Cutting	
V. Total Sector Allocable (I+II+III+IV)	
VI. Commodity Aid / General Prog. Ass.	VI.1. General Budget Support VI.2. Dev. Food Aid/Food Security Ass.
VII. Action Relating to Debt	
VIII. Humanitarian Aid	
IX. Unallocated / Unspecified	

From OECD Statistical data base: Creditor Reporting System

Regression specifications:

$$(1) \quad \lg FDI = \lg ODA_{\text{sec}} + \lg ODA_{\text{rest}} + \lg GDP_{\text{cap}} + GDP_{\text{gr}} + INFL + \text{dlgREER} + \text{dlgNR} + \text{dlgSgdp} + \text{dlgTRDgdp} + \text{dlgPOWcap} + \text{dlgEMPL} + POLITY + \text{dSCHOOL} + \lg POP + u.$$

$$(2) \quad \lg FDI = \lg ODA_{\text{sec}} + \lg ODA_{\text{rest}} + \lg GDP_{\text{cap}} + GDP_{\text{gr}} + INFL + \text{dlgREER} + \text{dlgNR} + \text{dlgSgdp} + \text{dlgTRDgdp} + \text{dlgPOWcap} + \text{dlgEMPL} + POLITY + \text{dSCHOOL} + \lg POP + \lg ODA_{\text{sec}}(-1) + \lg ODA_{\text{rest}}(-1) + \lg GDP_{\text{cap}}(-1) + GDP_{\text{gr}}(-1) + INFL(-1) + \text{dlgREER} + (-1) \text{dlgNR}(-1) + \text{dlgSgdp}(-1) + \text{dlgTRDgdp}(-1) + \text{dlgPOWcap}(-1) + \text{dlgEMPL}(-1) + POLITY(-1) + \text{dSCHOOL}(-1) + \lg POP(-1) + u.$$

$$(3) \quad \lg FDI = \lg ODA_{\text{sec}} + \lg ODA_{\text{rest}} + \lg GDP_{\text{cap}} + GDP_{\text{gr}} + INFL + \text{dlgREER} + \text{dlgNR} + \text{dlgSgdp} + \text{dlgTRDgdp} + \lg POP + \lg ODA_{\text{sec}}(-1) + \lg ODA_{\text{rest}}(-1) + GDP_{\text{gr}}(-1) + \text{dlgNR}(-1) + \text{dlgSgdp}(-1) + \text{dlgTRDgdp}(-1) + u.$$

$$(4) \quad \lg FDI = \lg ODA_{\text{eco}} + \lg ODA_{\text{pro}} + ODA_{\text{soc}} + \lg ODA_{\text{rest}} + \lg GDP_{\text{cap}} + GDP_{\text{gr}} + INFL + \text{dlgREER} + \text{dlgNR} + \text{dlgSgdp} + \text{dlgTRDgdp} + \lg POP + \lg ODA_{\text{eco}}(-1) + \lg ODA_{\text{pro}}(-1) + \lg ODA_{\text{soc}}(-1) + \lg ODA_{\text{rest}}(-1) + GDP_{\text{gr}}(-1) + \text{dlgNR}(-1) + \text{dlgSgdp}(-1) + \text{dlgTRDgdp}(-1) + u$$

$$(5) \quad \lg FDI = \lg ODA_{\text{eco}} + \lg ODA_{\text{pro}} + ODA_{\text{soc}} + \lg GDP_{\text{cap}} + GDP_{\text{gr}} + INFL + \text{dlgREER} + \text{dlgNR} + \text{dlgSgdp} + \text{dlgTRDgdp} + \lg POP + \lg ODA_{\text{eco}}(-1) + \lg ODA_{\text{pro}}(-1) + \lg ODA_{\text{soc}}(-1) + GDP_{\text{gr}}(-1) + \text{dlgNR}(-1) + \text{dlgSgdp}(-1) + \text{dlgTRDgdp}(-1) + u$$

$$(6) \quad \text{same as (4)}$$

$$(7) \quad \lg(FDI/\text{cap}) = \lg(ODA_{\text{eco}}/\text{cap}) + \lg(ODA_{\text{pro}}/\text{cap}) + \lg(ODA_{\text{soc}}/\text{cap}) + \lg(ODA_{\text{rest}}/\text{cap}) + \lg GDP_{\text{cap}} + GDP_{\text{gr}} + INFL + \text{dlgREER} + \text{dlgNR} + \text{dlgSgdp} + \text{dlgTRDgdp} + (\lg(ODA_{\text{eco}}/\text{cap}))(-1) + (\lg(ODA_{\text{pro}}/\text{cap}))(-1) + (\lg(ODA_{\text{soc}}/\text{cap}))(-1) + (\lg(ODA_{\text{rest}}/\text{cap}))(-1) + GDP_{\text{gr}}(-1) + \text{dlgNR}(-1) + \text{dlgSgdp}(-1) + \text{dlgTRDgdp}(-1) + u.$$

Where \lg is a prefix for the natural logarithm, d is a prefix if the variable has been differenced and dlg is a prefix for a differenced log of a variable.