The impact of the shadow economy on aid and economic development nexus in Egypt

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Abstract

Egypt suffers from low growth rates, increasing unemployment, poverty and a persistent shadow economy. Yet, Egypt is among the top 10 recipients of aid to promote economic development. Given this controversy, the purpose of this study is to examine the impact of the shadow economy on economic development and on aid effectiveness in Egypt from 1976 to 2013. There is a limited number of studies focusing on aid-development nexus for the case of Egypt which are inconclusive of the main channels that influence this nexus. Therefore, this paper adds to the literature by intersecting the shadow economy as an indirect channel affecting the aid-development nexus in Egypt. To this end, the fully modified OLS methodology is applied. The results indicate that the shadow economy has a negative impact on economic development and a diminishing effect on aid effectiveness. Because the effect of a change in aid on income is conditional on the size of the shadow economy in Egypt, it is important to calculate the marginal effect of aid on income for different values of the shadow economy. Based on the calculation of the marginal effect, one can conclude that the effect of aid on income is reversed given the presence of the shadow economy. The persistent existence of the shadow economy poses a major challenge for policy makers due its depressing effect on economic development and on aid effectiveness.

Keywords: Development Aid, Shadow economy, FMOLS, Egypt
JEL Classifications: C32, F35, O17

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1. Introduction

The effectiveness of aid for economic growth in developing countries is an important debate for both for recipients and donors. Several empirical studies have focused on investigating the impact on and effectiveness of aid for development for many countries and across different time spans. For instance, Dowling and Hiemenz (1982), Hansen and Trap (2000), Burnside and Dollar (2000), Dalgaard et al. (2004) and Karras (2006) concluded that there is a positive impact of aid on economic growth. However, Boone (1996), Williamson (2009), Remmer (2004) and Brautigam and Knack (2004) argued that aid is ineffective and negatively impacts economic growth. While some authors such as Burnside and Dollar (2000) and Collier and Dollar (2002) emphasized that the effectiveness of aid is conditional, other authors, including Dalgraad and Hansen (2001), Hansen and Trap (2000) and Lenski and White (2001), have found decreasing returns of aid on economic growth. Hence, we can conclude that the literature is mixed regarding the impact on and effectiveness of aid for economic growth.

Egypt is among the top 10 recipients of foreign aid. Among other forms of aid, Egypt has received significant economic assistance from the US amounting to $76 billion in foreign aid from 1948 to 2015[1]. The objectives of this foreign aid were to improve public health, education, economic development, democracy and governance (Sharp, 2017). Additionally, Egypt continues to be a major recipient of development aid (ODA). Since the 1970s, Egypt has received on average $5 million, but in 2013 alone, the country received $5.6 million in the form of development aid. This development aid mainly

[1] Egypt receives $1.3 billion in form of military aid from the US since 1987 until today (Sharp, 2017). The focus of this paper is on development aid measured by ODA%GNI published by World Bank.

targets the economic sector ($1234 million in net ODA as of 2015) and the social sector ($361 million in net ODA as of 2015) (OECD, 2016).

One can conclude that Egypt receives quite high amounts of foreign development aid. However, this aid did not contribute to the institutional development nor to the economic development of Egypt. On a macro level, Egypt suffers from low GDP per capita growth, unemployment, and poverty[1], while on a micro level, Egypt has weak institutional quality, weak rule of law and high corruption levels. Most importantly, Egypt still suffers from a persistent shadow economy that limits the country's long-term development and growth (Hassan and Schneider, 2016). Given these issues, it is interesting to intersect the shadow economy with the aid-development nexus and to investigate the impact of the shadow economy on aid and its effectiveness.

There are limited studies[2] focusing on the aid-development nexus in Egypt, and these studies are inconclusive regarding the major indirect channels that might influence this nexus. These studies have concluded that aid does not stimulate development in Egypt in the long run because the shadow economy constitutes a major part of Egypt's economy, and it still weighs heavily on the income of the country (Hassan and Schneider, 2016). Thus, it is important to analyze the role and influence of the shadow economy on economic development and aid effectiveness for the case of Egypt from 1976 to 2013.

The aim of this paper is to add to the mixed empirical literature on the aid-development nexus and analyze the influence of the shadow economy in Egypt by comparing the

[1] During the last couple of years, GDP per capita growth was at below zero levels, Unemployment soared reaching 13% in 2013 and 25% of the population live in poverty as of 2010 (World Bank, 2016).
[2] Ali (2013), Abuelfoul (2013) and Emara (2013).

impact of aid without the presence of the shadow economy and with the presence of the shadow economy on economic development in Egypt.

The remainder of the paper is organized as follows. Section 2 provides the theoretical background on the effectiveness of aid, the shadow economy in Egypt and the relationship between them. In section 3, the methodological estimation is discussed. Section 4 presents the results. Finally, section 5 concludes the paper.

2. Theoretical Background

2.1 Effectiveness of aid

The impact of aid on the recipient country's development is a controversial matter, and the empirical results are mixed regarding the direction of the impact of aid on growth. One group of studies claims that aid positively impacts economic growth (Asteriou, 2009; Clemens et al., 2004; Dalgraad and Hansen, 2001; Hansen and Trap, 2000), while a second group of studies argue that aid is ineffective and counterproductive, thus indicating that there is a negative relationship between aid and growth (Ovaska, 2003; Prokopijević 2007; Williamson, 2009). Importantly, Burnside and Dollar (2000) and Collier and Dollar (2002) concluded that the effectiveness of aid and the efficient allocation of aid are conditional upon sound policies in the recipient country.

The literature on the impact of aid on economic growth can be divided into three different generations (Hansen and Tarp, 2000). The first generation of studies focused on the aid-growth nexus within the context of 'gap models'. These studies argued that aid would alleviate financial gaps, namely savings and investments gaps, and thus in turn would increase growth in the recipient country. Empirical studies at this time largely focused

directly on the impact of aid on investments and savings. It has been argued based on the Harrod-Domar equation that a significant inflow of aid creates a substantial amount of savings to finance investment, which in turn stimulates economic growth (Dowling and Hiemenz, 1982; Burnside and Dollar, 1997; Hansen and Tarp, 2000; Mosley et al., 1987). Thus, the first generation of studies investigated the aid-growth nexus rather indirectly through aid-saving or aid-investment relationships.

The second generation of studies focused on directly investigating the aid-growth nexus, rather than indirectly. However, there is no consensus regarding the effectiveness and direction of aid. It has been argued that such inconsistency in the empirical results is due to sample sizes, methodologies, assumptions and data transformations (Museru, et al. 2013; Juselius et al., 2013; Nowak-Lehmann et al., 2012).

The third generation of studies, developed in the late 1990s, introduced a new debate to the literature of whether aid effectiveness is conditional or unconditional. The first researchers to introduce the concept of the conditionality of aid effectiveness were Burnside and Dollar (2000), followed by Collier and Dollar (2002), Collier and Hoeffler (2004) and Dalgaard et al. 2004).

Based on a survey of 29 empirical studies across the three generations of studies, Hansen and Tarp (2000) argued that regressions that show a statistically significant and a positive aid-growth nexus had prevailed. A recent time series analysis of the long-run impact of aid on economic growth in 36 sub-Saharan African countries found that aid played a positive developmental role of the macro economy in most of the recipient countries (Juselius et al., 2013). However, based on another time series study, it was argued that

aid has an insignificant or only slightly significant negative impact on the per capita income of the recipient country (Nowak-Lehmann et al., 2012).

Boone (1996) and Remmer (2004) argued that aid negatively impacts economic growth because aid increases the size of government and consumption and reduces tax revenues. The increase in government consumption can either be in the form of an increase in the salaries of public servants or higher military spending. As a result, domestic savings and investment might decrease the slowing of economic growth despite the inflow of aid (Dowling and Hiemenz, 1982). Additionally, it has been argued that the direction of aid limits its effectiveness and its impact on economic growth. For instance, if aid is directed to finance a domestic financial deficit, then inflation and interest rates are expected to increase, thus discouraging private investors and resulting in stagnation in the private sector and a decrease in total investment, which negatively impacts economic growth (Dowling and Hiemenz, 1982).

Additionally, high aid inflows channeled to corrupt governments can lead to negative impacts due to the high transaction costs associated with aid reform programs. Moreover, aid directed to weak governments with no clear development target agendas might be ineffective due to pressure on and incentives for powerful public servants who have conflicts of interest and moral hazard problems with regard to the distribution and allocation of aid (Brautigam and Knack, 2004). By the same token, Williamson (2009) claimed that the aid allocation process is influenced by different stakeholders, special interests and rent-seeking activities. As a result, aid fails to promote growth by increasing savings and investment. It has also been argued by Brautigam and Knack (2004) that high inflows of aid to Africa are associated with a significant weakening of the quality of governance and with lower tax collection efforts, which then created a vicious cycle of

weak institutions and economic decline. The continuous large transfers of aid to poor, developing countries lead to aid dependence in which the local government fails to maintain and improve the infrastructure and fails to provide quality public goods and services without aid assistance and aid funding (Brautigam and Knack, 2004).

For the case of Egypt, Ali (2013), Abuelfoul (2013) and Emara (2013) analyzed the impact of aid on growth in Egypt while controlling for other variables and concluded that aid negatively influences long-run economic growth. This limited number of studies focusing on the aid-growth nexus in Egypt are inconclusive regarding the major indirect channels that influence this nexus. Because the shadow economy constitutes a major part of the Egypt's economy, it is important to analyze the role and influence of the shadow economy on the effectiveness and impact of aid on economic development.

2.2 Shadow economy

Most countries around the globe suffer to varying degrees from sizable shadow economies. The shadow economy has an invisible nature and is hidden from the legal part of the economy. One of the ongoing concerns facing politicians and scholars is tackling the shadow economy. Generally, the shadow economy involves all currently unrecorded economic (market-based) activities that, if registered, would contribute to the officially calculated national income (GDP). The agents participating in the shadow economy absorb efficient resources from the official economy, yet they are unproductive and add minimum value to the overall economy (Schneider et al., 2010).

The shadow economy has diverse effects on the long-term growth and development of a country. The shadow economy might lead to negative effects on development, but it can also have positive impacts. However, the negative effects of the shadow economy are

more severe than its positive effects, especially if it has a substantial weight compared to the official economy. Among the negative effects of the shadow economy is a shrinking of the tax base and a lowering of governmental revenues, thus creating a vicious cycle of continuous inefficient increases of tax rates. When tax revenues decrease due to an increase in informal activities, governmental revenues decrease and in turn, the provision of public goods and services deteriorates. Therefore, the shadow economy reduces public finance and investment, which in turn influences the development of the economy (Schneider et al., 2010).

Second, the shadow economy creates distortions in the official statistics and thus provides policy makers with the wrong indicators, leading to ineffective macro policies (Tanzi, 1999; Frey, 2000; Schneider et al., 2000). Moreover, the shadow economy creates distortions in resource allocation by absorbing labor and capital resources from the official economy. Most importantly, a shadow economy has a negative impact on a country's growth. Loayaza (1996) concluded that the shadow economy reduces the official economic growth in Latin America due to a reduction in the provision of public goods and services and inefficient resource allocation.

The shadow economy also has negative impacts on the overall economy that are not necessary related to economic development. These include increased pollution (Biswas et al., 2012), unfair competition for formal firms that abide by the law that adds minimal value to the formal economy due to the low productivity of the informal firms, a reduction in global competitiveness, and diminished working conditions (Bacchetta et al., 2009, La Porta and Schleifer, 2014; Gerxhani, 2004, Schneider and Enste, 2000). Additionally, the existence of the shadow economy creates distortions in social norms by encouraging corruption, the weak rule of law, and disrespect for official institutions. A shadow

economy is thus an indicator of low institutional quality and illegitimacy (Schneider and Enste, 2000)[1].

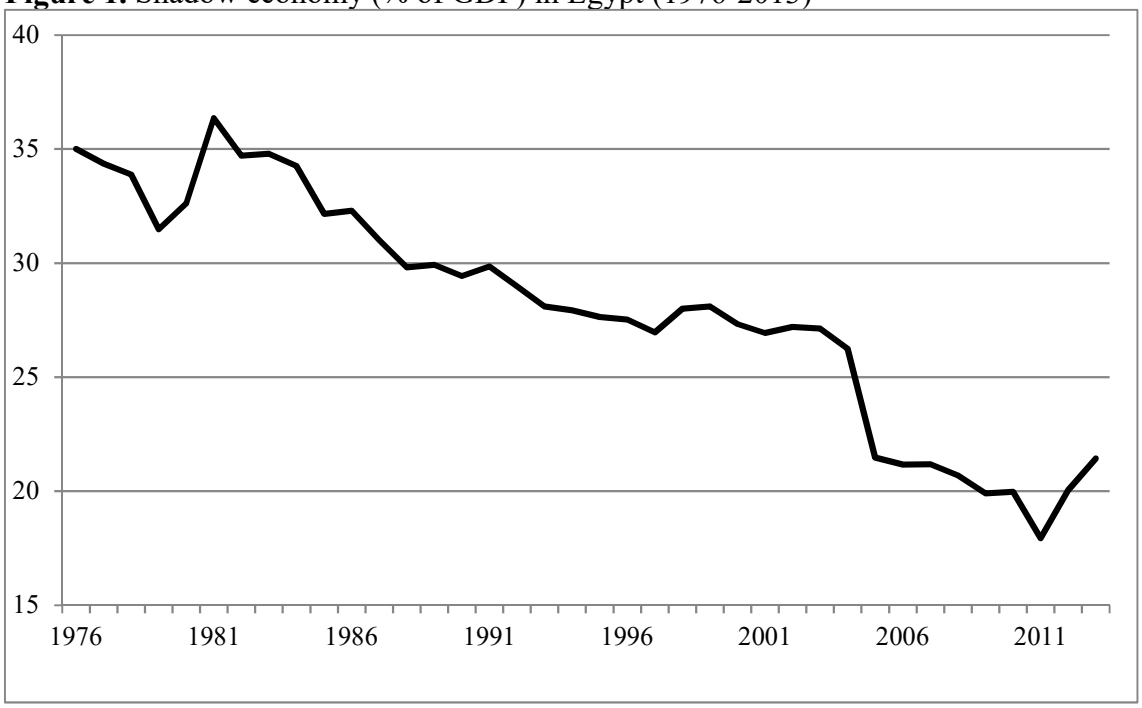
However, it has been counterargued that the shadow economy might have positive effects. First, the shadow economy acts as a safe-harbor and employer of last resort in times of crisis and turmoil. Additionally, the shadow economy creates stimulating effects, as the income generated in it is further spent in the official economy (Schneider et al., 2010). Adam and Ginsburg (1985) concluded that there is a positive relationship between a shadow economy and the official economy.

For the case of Egypt, the shadow economy cannot be neglected, as it has retained a highly persistent share of the overall economy over time, which then burdens the growth of the formal economy. According to estimations by Hassan and Schneider (2016), the shadow economy as percentage of GDP was significant during the 1970s and 1980s, reaching more than 30% of GDP. Since the 1990s, however, there is evidence of a continuous decline in the size of shadow economy in Egypt, reaching approximately 20% of GDP in 2013. As shown in Figure 1, the trend of the shadow economy is decreasing, but this is not necessary good news because the shadow economy still has substantial weight compared to the official economy, thus hindering its development. Based on the Egyptian Labour Survey (ELS), 60% of informal laborers are women, and the majority are single and young (15-9 years old). Additionally, 68% are illiterate, compared to 26% who have above intermediate education. The share of informal workers is most prominent in the textile industry, furniture, paper and wood production, and metal and leather production (Selwaness and Zaki, 2013). Although the shadow economy in Egypt is decreasing, it is

[1] Choi and Thum (2005) argued that the shadow economy which is present in a corrupted environment enhances formal economic activities and thus acts as a complement to the official economy by mitigating government-induced distortions.

still a prominent characteristic of the economy that hinders Egypt's development and growth.

Figure 1. Shadow economy (% of GDP) in Egypt (1976-2013)



Source: Hassan and Schneider (2016).

Given the negative externalities of the shadow economy with regard to the overall economy, it is interesting to investigate how the shadow economy can influence the allocation of aid inflows and the effectiveness of aid to generate income and economic growth.

2.3 Linkages between shadow economy and aid

There are different indirect channels through which the shadow economy influences the aid-development nexus and hence the effectiveness of aid. The shadow economy hinders an economy's development. First, the shadow economy inefficiently absorbs resources such as human (labor) resources and physical resources from the formal economy. Second, the shadow economy limits public resources that could be used efficiently. Third,

the shadow economy reduces government spending and limits the ability of the government to efficiently finance its public sector (Loayza, 1996; Dell'Anno et al., 2007). As argued by Schneider and Enste (2013), the shadow economy is a waste of resources. Agents operating in the shadow economy inefficiently absorb substantial resources from the formal economy, yet such agents are highly unproductive and do not add value to the overall economy. This implies that the shadow economy negatively influences resource allocation. In return, the allocation and effectiveness of aid to recipient countries that have a prominent shadow economy are affected.

Additionally, the shadow economy leads to misrepresentations in macroeconomic indicators. In turn, the quality and direction of governmental policies are erroneous (Tanzi 1999; Schneider et al., 2010). Burnside and Dollar (2000) argued that aid effectiveness highly depends on sound governmental policies. This implies that effective aid allocation highly depends on macroeconomic stability and sound fiscal, monetary and trade policies (Burnside and Dollar, 2000). Additionally, Durbarry et al. (1998) argued that the effectiveness of aid is enhanced when appropriate policies are in place. Because a shadow economy is present in weak policy environments and leads to erroneous governmental policies, the effectiveness of aid is highly questionable.

By the same token, aid might be ineffective and the aid budget might be highly misallocated when it is based on falsified and misrepresented official statistics that do not accurately reflect the true macroeconomic status of the recipient country. The shadow economy highly distorts labor statistics. For instance, a country with a low 'official' unemployment rate but a large shadow economy would receive less aid than it needs compared to a country with a high 'official' unemployment rate but a small shadow economy. Therefore, the failure to capture the true presence of the shadow economy and

the subsequently misrepresented official statistics lead to inefficient aid programs and misallocation of aid budgets (Eilat and Zinnes, 2000).

Moreover, the shadow economy is highly associated with low institutional quality and hence potentially higher levels of corruption and less democracy (Teobaldelli and Schneider, 2013; Schneider, 2010; Razmi et al., 2013). Dreher and Schneider (2006) argued that the shadow economy and corruption are complements to each other in low-income countries, meaning that high levels of shadow economy are linked to high levels of corruption. Therefore, corruption distorts the allocation of resources, including aid, enriches corrupt bureaucrats and promotes bad governance. In the presence of corruption, aid encourages rent-seeking behaviors and a further weakening of institutions. Hence, the core objective of aid fails, and economic growth is not achieved (Okumu, 2015, Svensson, 2000). Additionally, Svensson (1999) argued that aid effectiveness is conditional on the degree of democracy in the recipient country. In less democratic countries, aid allocation is not productive and is not channeled for development purposes; instead, it is used to finance the government's own non-productive activities (Svensson, 1999).

Given the unobservable nature of the shadow economy, aid should target only the legal and official part of the economy. This invisible nature of the shadow economy influences the effectiveness of aid programs. In most cases, informal firms operating in the shadow economy do not have access to aid programs and budgets. Therefore, aid allocation and its direction might not be efficient due to a failure to acknowledge the existence of the shadow economy and a failure to target informal labor and firms operating in the hidden economy in the aid budget (Eilat and Zinnes, 2000).

3. Methodology

3.1 Data description

To examine the impact of aid on economic development in Egypt in the presence of the shadow economy, the following independent variables are used in the model: Net Official Development Assistance (ODA) as a percentage of GNI (*AID*), the share of total exports and imports as a percentage of GDP (*openness*), the gross enrollment ratio at a tertiary level (%) (*education*), foreign direct investment as a percentage of GDP *(FDI)*, credits provided by financial sector (percentage of GDP) *(financial development),* total employment as a percentage of the population *(employment),* capital formation as a percentage of GDP *(capital),* the share of personal remittances in GDP (*remittances),* the size of the shadow economy as a percentage of GDP (*shadow*) and a policy and institutional environmental indicator proxied by the Vanhanen index (*policy*). This index provides an objective measure of democracy by considering three aspects: the degree of electoral competition, the degree of electoral participation and a combined index of democratization. The index ranges from 0 to 100, from the lowest level of political openness to the highest level of political openness. The index is calculated by taking the product of the degree of participation and the degree of competition[1] and subsequently dividing the product by 100 (Vanhanen, 2000). The data are available annually from 1976 to 2013[2]. The main dependent variable is real GDP per capita *(development)*. The main source of the time series data covering the period under study is the World Development Indicators (WDI) database of the World Bank (World Bank, 2016), except for total

[1] The degree of participation is measured using the percentage of voters in the last election, and the degree of competition is the percentage of the vote for the smallest party in the last election (Vanhanen, 2000).
[2] The source is http://www.fsd.uta.fi/en/data/catalogue/FSD1289/meF1289e.html, accessed on 08 June 2017.

employment, which is derived from the yearly bulletin of the National Bank of Egypt (NBE) from 1976 to 2013. The source for the shadow economy is Hassan and Schneider (2016). ODA is defined as "*flows of loan disbursements made on concessional terms and grants provided by official agencies to countries and territories on the DAC list of ODA recipients*." The ODA conveys grants that include loans of at least 25 percent of the total grant (calculated at a rate of discount of 10 percent) (World Bank, 2016). The main objective of ODA is to promote the economic development and welfare of developing countries. The next important variable in our analysis is the relative size of the shadow economy compared to the formal economy. Hassan and Schneider (2016) applied the Multiple Indicators Multiple Causes (MIMIC) modeling approach to estimate the size of the shadow economy as measured as a percentage of GDP. This confirmatory approach simultaneously considers different causes and indicators of the shadow economy instead of relying on only one proxy to measure the unobserved economy. The time series data are complete and annual from 1976 to 2013 for the case of Egypt. Table A1 in the appendix presents the details and summary statistics of the above variables.

Based on the theoretical background discussed above, the main hypothesis is as follows:

Hypothesis: The shadow economy has a decreasing effect on aid effectiveness in Egypt.

3.2 Empirical estimation

To test for the influence of the shadow economy on the effectiveness of aid in stimulating economic development in Egypt, the fully modified OLS (FM-OLS) method is applied. The FM-OLS model was developed by Phillips and Hansen (1990) and is chosen based on its two major advantages. Most importantly, the FM-OLS model accounts for co-integration relationships among the variables by estimating a single cointegrating

equation. Thus, the first major advantage of FM-OLS is that it addresses the endogeneity problem. FM-OLS applies a semi-parametric correction to modify the least squares to account for serial correlation effects and endogeneity in the regressors that arise due to cointegrating relationships. The second advantage is that FM-OLS provides reliable estimates for small sample sizes (in our case, n=38) without influencing the quality of the estimators in a case of a low number of observations (Phillips and Hansen, 1990; Phillips, 1993).

Most macroeconomic time series data are trending and show data persistence over time. Thus, the data must be checked for stationarity. The first step in the FM-OLS model is to determine the order of integration of each variable. In this study, the Augmented Dicky Fuller (ADF) and Phillip-Perron (PP) unit root tests on the level data and the first differences of the variables are applied to determine the order of integration. Importantly, all of the variables are of order I=1, and none of the variables is I=2, which validates the application of the FM-OLS model to test the long-run relationship between aid and economic development given the presence of the shadow economy in Egypt. The results of the unit root tests are shown in Table A3 in the appendix.

The second step in estimating the FM-OLS model is to determine whether the data share a common deterministic trend. Thus, the Johansen Test of co-integration is applied in order to determine the number of co-integrated equations and to verify the long-run relationship among the variables. Because the co-integration test is sensitive to the lag length, the optimal lag length chosen given the number of observations is lag =1. The Trace and Maximum eigenvalues are reported in Table A4 in the appendix. Based on the results of the unit root tests and the co-integration test, we find evidence of a long-run relationship between the variables; therefore, the FM-OLS model is applied to test for our

hypothesized relationship. Notably, differencing is not recommended because it leads to the loss of important long-run information among the cointegrated variables (Sims et al. 1990).

4. Results

This section presents the main results of the FM-OLS model to investigate the effectiveness of aid (ODA%GNI) for development in Egypt in the presence of the shadow economy. To this end, the effectiveness and impact of aid on economic development are compared with and without the introduction of the shadow economy in the nexus while controlling for other important variables.

In the first attempt in models (1) and (2) as shown in Table 1, the typical impact of aid on development is tested while controlling for other important variables mentioned in the literature without the introduction of the shadow economy. Based on the results of the estimation, aid has a significantly negative impact on economic development for the case of Egypt in the long run. This conclusion was also reached by Ali (2013), Abuelfoul (2013), and Emara (2013), who also examined the impact of aid on development in Egypt in the long run. This result supports the argument by various authors that aid does not necessarily lead to economic development. For the case of Egypt, the country suffers from a bad policy environment, bureaucratic corruption and macroeconomic instability, which dampens the impact of aid on development. Ali (2013) argued that the negative impact of aid on economic development in Egypt in the long run is mainly due to bad governance and inefficient policy-making processes.

Table 1: FM-OLS model
Dependent variable: Economic Development

Variables/ Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)[1]	(12)	(13)	(14)
AID	-0.05***	-0.002	-0.02***	0.003	0.08**	0.07***	0.06***	0.04*	0.03	0.03**	0.04***	-0.21	-0.002	-0.05
	(5.35)	(-0.94)	(-5.60)	(0.10)	(2.58)	(2.69)	(2.65)	(1.84)	(1.36)	(1.96)	(3.54)	(-1.49)	(-0.07)	(-0.59)
Shadow			-0.04***	-0.04***	-0.03***	-0.02***	-0.02***	-0.03***	-0.03***	-0.03***	-0.02***		-0.04***	-0.04***
			(-12.18)	(-10.94)	(-6.46)	(-4.66)	(-6.16)	(-6.32)	(-6.29)	(-6.65)	(-7.21)		(-10.32)	(-9.91)
SE*AID				-0.001	-0.003***	-0.002***	-0.002***	-0.001**	-0.001	-0.001**	-0.001***		-0.0005	-0.0002
				(-0.74)	(-2.97)	(-2.98)	(-2.93)	(-2.07)	(-1.51)	(-2.15)	(-3.76)		(-0.57)	(-0.23)
Policy												0.04	0.12	0.04
												(0.11)	(1.69)	(0.29)
Policy*AID												0.27		0.06
												(1.15)		(0.65)
Education		0.01***			0.01***	0.01***	0.01***	0.01***	0.01***	0.01***	0.01***			
		(8.09)			(3.30)	(4.45)	(5.25)	(4.29)	(4.45)	(5.82)	(8.29)			
Employment		0.08***				0.02**	0.03***	0.02**	0.02***	0.03***	0.04***			
		(13.46)				(2.53)	(3.23)	(2.55)	(3.46)	(4.62)	(7.69)			
FDI		-0.02***					-0.01***	-0.02***	-0.01***	-0.01***	-0.001***			
		(-3.62)					(-3.76)	(-4.85)	(-3.58)	(-4.71)	(-7.89)			
Financial Development		-0.001						0.001**	0.002**	0.001**	0.001**			
		(-0.95)						(2.04)	(2.28)	(2.06)	(2.43)			
Capital		-0.02***							-0.005*	-0.01***	-0.01***			
		(-8.29)							(-1.94)	(-2.83)	(-4.17)			
Remittances		0.01								0.01**	0.002			
		(-8.30)								(2.46)	(1.12)			
Openness		0.003***									0.002***			
		(3.88)									(4.26)			
Adj R^2	53%	96%	92%	92%	94%	95%	97%	97%	98%	98%	98%	60%	92%	92%

Notes: This table summarizes the results of the FMOLS regressions conducted in Eviews. Economic development as the main dependent variable is proxied by GDP per capita in natural logarithm. The data are annual from 1976 to 2013 with no missing data. * significance at 10%, ** significant at 5%, *** significance at 1%. T-statistics are in parentheses. Source: Author's own calculation.

[1] Residual diagnostic in the estimated model's residuals is important for reliability of results. Table A5 shows the results of the residual diagnostics including Correlograms -Q-statistics and Correlograms of Squared Residuals to check autoregressive conditional heteroskedasticity (ARCH) in the residuals. The results show that the model is stable and satisfactory.

In the second attempt, the same relationship is tested, but in addition, the presence of the shadow economy and its impact on aid effectiveness in Egypt are controlled. To this end, an interaction term (SE*AID) is added to the specifications, together with the other controls that might influence the aid-development nexus. We also control for the shadow economy in Egypt, i.e., we take into consideration the existence of the shadow economy. The impact of aid on economic development becomes positive and significant. This result implies that aid programs that have an established aid agenda to tackle the shadow economy and to address the weak points in the formal economy that motivate individuals to join the shadow economy have a positive impact on economic development in Egypt over the long run by helping with the transition to formalize the shadow economy. However, the shadow economy has a diminishing and negative impact on the efficiency of aid for the case of Egypt, as indicated by the interaction term.

Additionally, the impact of the shadow economy on the formal economy; i.e., economic development in Egypt, is negative. This negative relationship between the shadow economy and economic development was also found by Loayza (1996). The shadow economy leads to different negative externalities that influence the official economy. The shadow economy distorts the tax system, which leads to inefficient policy-making processes and the misallocation of official resources. Additionally, the shadow economy is persistent in corrupt and unstable political and economic economies, which discourages private foreign and local investors as well as foreign aid programs.

The results shed light on the importance of considering the existence of the shadow economy and its interactions with the overall economy. The shadow economy reduced the efficiency of the aid received by Egypt, which has important implications for policy makers to consider the importance of tackling the shadow economy. To observe the full

picture regarding the impact and efficiency of aid, policy makers in Egypt need to take into account the shadow economy.

The impact of education on development is positive and significant. This result implies that higher investment in education improves the quality of the labor force and increases productivity and output in the economy, thus increasing economic development. Elewa (2015) recently concluded that increased investment in human capital, i.e., education, increases economic development in Egypt over the long run. The author argued that education led to an increase in public revenues due to the increased capacity of labor to produce and increased employment levels, thus encouraging economic development (Elewa, 2015). By the same token, increases in employment and the expansion of the labor market increase labor productivity, output, consumption, and public revenues, which then leads to economic expansion and higher rates of economic development. Employment development decreases unemployment, which has a major negative impact on a country's general economy and leads to economic stagnation and lower economic growth (El-Agrody et al., 2010).

The impact of FDI on economic development through the integration of the domestic economy with global economies, through increased competition in the domestic economy of the host country, and through the transfer of new technologies and know-how is negative in the case of Egypt. The main argument is that the effects of FDI on the host country depend heavily on the country's internal characteristics and conditions (Moura and Forte, 2010). Egypt's economic, social and political status limits the positive effects of FDI on economic development. Egypt suffers from a prominent shadow economy, a high level of corruption of public servants, weak rule of law, high unemployment levels and population growth.

On the other hand, openness to trade has a positive and significant impact on economic development in the case of Egypt. Trade openness is considered an important engine of economic development, especially for developing countries. The positive link between increased openness and economic development occurs through increased production levels and investment capacity and higher employment (Idris et al., 2016). Based on a recent study, the impact of openness on trade for the case of Egypt given the aid-development nexus is positive and significant in the long run (Sabra and Eltalla, 2016; Eamar et al., 2013).

Furthermore, financial market development is a major contributor to economic development, especially in a developing country such as Egypt. Financial development impacts development positively through a reduction in the information and transaction costs required to obtain credit and by providing easy access to capital for productive projects (Hassan et al., 2011; Durusu-Ciftci, 2017). For the case of Egypt, Abu-badr and Abu-Qarn (2008) found evidence that financial development leads to economic development through enhanced efficiency and the mobilization of capital and resources for investment.

Consistent with the literature on the case of Egypt, capital formation has a significantly negative impact on economic development. It has been argued that inefficiency in capital accumulation strategies and the combination of weak economic and political policies are major contributors to the negative impact of gross capital formation on the aid-development nexus in Egypt (Ali, 2013).

Finally, the impact of remittances on development for the case of Egypt[1] is positive yet insignificant. Remittances are one of the most important sources of income from abroad;

[1] For microeconomic studies on remittances in Egypt, please refer to Adams (1991) and Elbadaway and Rouchdy (2010).

however, they do not have a significant impact on long-term development because especially in a developing country such as Egypt, remittances are used for household consumption rather than productive investments that would boost long-term development (Giuliano and Ruiz-Arranz, 2006; Glytsos, 2005).

Additionally, the importance of the impact of the policy and institutional environment and its interaction with aid on economic development in Egypt has been controlled. As a proxy of policy, the Vanhanen Index of Democracy is used. For the case of Egypt, a good policy environment does not play a significant role in influencing aid and its effectiveness in promoting economic development. Easerly et al. (2004) and Dalgraad and Hansen (2001) argued that the significance of the policy-aid interaction becomes weak when additional data become available, for example by expanding the dataset by a number of countries or adding controls and/or years. The authors also argued that Burnside and Dollar (2000) provided a major contribution to the literature, yet they did not furnish the final answer on aid effectiveness (Easterly et al., 2004), as policy and other channels such as the presence of the shadow economy also play roles in the effectiveness of aid, as shown by the results here. It is critical to note that the addition of the policy and institutional environment variable to models (13) and (14) in Table 1 shows that the importance of the direct impact of the shadow economy on the effectiveness of aid is still negative, yet it became not very important. The insignificance of both interaction terms highlights that neither the shadow economy nor the policy environment has a dominating role in influencing aid and its effectiveness. One can therefore conclude that the shadow economy in Egypt has a negative impact on aid and economic development, while a good policy environment promotes the effectiveness of aid.

Finally, the marginal impact of a 1% increase in aid on the income level is calculated at a 95% confidence interval, as shown in Figure 2, at different levels of the shadow economy in Egypt based on model 11 in Table 1. Because the effect of a change in aid on the income level is conditional on the size of the shadow economy in Egypt, it is important to go beyond the model coefficients per se and calculate the marginal effects of aid on income for different values of the shadow economy. This analysis shows that the positive impact of each additional increase in aid received by Egypt decreases as the size of the shadow economy increases. This result implies that an increasing size of the shadow economy in Egypt reduces the impact of aid on the level of income. Therefore, it is important for policy makers to tackle the shadow economy and reduce its size in order to manage its decreasing effect on aid.

5. Conclusion

This paper investigates the impact of the shadow economy on aid and economic development for the case of Egypt over a long period of time. Although many studies have focused on the aid-development nexus over recent decades, its application in Egypt and a focus on the existence of the shadow economy are limited.

The shadow economy in Egypt is non-negligible and has retained a persistent share of the overall economy over time. Therefore, it is quite interesting to intersect the impact of the shadow economy with the aid-development literature, especially for the case of Egypt.

The main contribution of this paper is the investigation of the impact of the shadow economy on economic development and aid effectiveness. The impact of the shadow economy on economic development is negative and has a dampening effect on aid effectiveness. The shadow economy affects the efficiency of the tax system through tax

evasion, which reduces government revenues and thus the quality of public goods and services. Additionally, the shadow economy is a source of resource misallocation that leads to the inefficient use and allocation of resources; namely, human resources, aid and capital resources. Additionally, the shadow economy distorts policy decisions due to the biases in official publicly available information and macroeconomic data. Most importantly, the existence of the shadow economy promotes corruption and instability, which ultimately discourages private foreign and local investors as well as foreign aid programs that have the objective of increasing economic development and enhancing the economy.

A major policy implication is that the persistent existence of the shadow economy over time in Egypt poses a major challenge for policy makers due to its negative impact on the official economy and its dampening effect on aid effectiveness. Analyzing the intersection of the shadow economy in the aid-development nexus is novel and highlights the importance of tackling and formalizing the shadow economy in Egypt. Hence, the complete separation of the shadow economy and eliminating its interaction with the official economy are not possible.

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Appendix

Table A1. Variables

Variables	Definition	Source
Development	Log of real GDP per capita is gross domestic product divided by midyear population.	World Bank (2016)
AID	Net official development assistance (ODA) consists of disbursements of loans made on concessional terms (net of repayments of principal) and grants by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC to countries and territories in the DAC list of ODA recipients. Data are in percentage of GNI.	World Bank (2016)
Remittances	Personal remittances comprise personal transfers and compensation of employees in cash or in kind made or received by resident households to or from nonresident households. Data are in percentage of GDP.	World Bank (2016)
FDI	The net inflows of investment. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. Data are in percentage of GDP.	World Bank (2016)
Openness	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	World Bank (2016)
Education	Tertiary school enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.	World Bank (2016)
Financial Development	Domestic credit provided by the financial sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government. Measured as percentage of GDP.	World Bank (2016)
Employment	Total number of employed formally in the official economy relative to total population	National Bank of Egypt – Yearly Economic Bulletin

Policy	The Vanhanen democracy index. The index is calculated by taking the product of the degree of participation and the degree of competition	Finish School Data Archive. FSD1289.
Shadow	All economic activities that should have included in the national GDP. It excludes Do-it-Yourself, criminal and voluntary activities. Size of the shadow economy is measured as % of GDP by MIMIC model.	Hassan and Schneider (2016)

Source: Author

Table A2. Summary Statistics

	Develop-ment	AID	Shadow	Remitt-ances	Capital	FDI	Open-ness	Educat-ion	Employ-ment	Finan-cial	Polic-y
Mean	13041.02	5.17	28.00	7.49	22.98	2.45	53.81	44.05	26.87	87.74	0.66
Max.	19406.31	19.06	36.36	14.58	34.92	9.34	82.18	61.74	30.28	110.93	1.4
Min.	6960.22	0.18	17.94	2.86	14.44	-0.20	35.33	25.15	23.39	60.21	0.55
Std. Dev.	3638.73	5.32	5.07	3.33	5.56	2.22	11.64	12.16	1.87	13.55	0.18
Obs.	38	38	38	38	38	38	38	38	38	38	38

Source: Eviews

Table A3. Unit root tests (trend and intercept)

Test/ Variables	ADF		PP	
	Level	**First difference**	**Level**	**First difference**
Development	-2.154116	-5.226815***	-3.372898	-5.237677***
AID	-3.893857	-4.958795***	-2.543832	-5.095892***
Shadow	-2.703984	-5.796701***	-2.703984	-5.792710***
Shadow*AID	-4.082310***	-5.034534***	-3.082794	-5.207922***
Education	-1.519074	-4.619053***	-1.820776	-4.623070***
Employment	-2.180602	-5.033227***	-2.005366	-5.029728***
Financial	-3.217520	-2.928963	-2.455671	-5.020281***
Capital	-3.631158	-5.231073***	-2.770590	-8.955722***
Remittances	-2.637653	-5.776551***	-2.552618	-8.274319***
Openness	-3.893047	-4.772640***	-2.475925	-5.315103***
Policy	-2.91	2.03	-0.80	-6.38***

Source: Eviews

Table A4. Cointegration test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.992842	744.4674	285.1425	0.0000
At most 1 *	0.973482	566.6449	239.2354	0.0000
At most 2 *	0.955731	435.9668	197.3709	0.0000
At most 3 *	0.923358	323.7375	159.5297	0.0000
At most 4 *	0.841595	231.2675	125.6154	0.0000
At most 5 *	0.799396	164.9340	95.75366	0.0000
At most 6 *	0.698954	107.1028	69.81889	0.0000
At most 7 *	0.482896	63.88507	47.85613	0.0008
At most 8 *	0.418911	40.14265	29.79707	0.0023
At most 9 *	0.416897	20.59998	15.49471	0.0078
At most 10	0.032297	1.181888	3.841466	0.2770

Trace test indicates 10 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

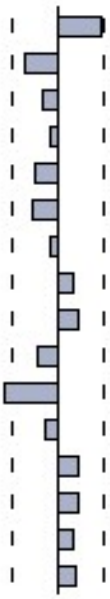
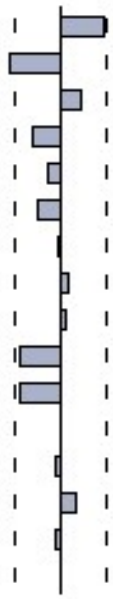
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.992842	177.8225	70.53513	0.0000
At most 1 *	0.973482	130.6781	64.50472	0.0000
At most 2 *	0.955731	112.2293	58.43354	0.0000
At most 3 *	0.923358	92.47005	52.36261	0.0000
At most 4 *	0.841595	66.33350	46.23142	0.0001
At most 5 *	0.799396	57.83115	40.07757	0.0002
At most 6 *	0.698954	43.21776	33.87687	0.0029
At most 7	0.482896	23.74241	27.58434	0.1440
At most 8	0.418911	19.54267	21.13162	0.0822
At most 9 *	0.416897	19.41810	14.26460	0.0070
At most 10	0.032297	1.181888	3.841466	0.2770

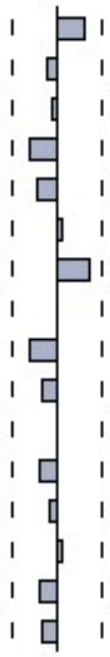
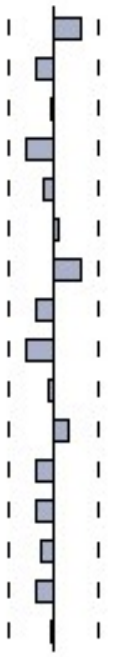
Max-eigenvalue test indicates 7 cointegrating eqn(s) at the 0.05 level

Source: Eviews

Table A5. Residual Diagnostics based on FMOLS Model 11
Correlograms -Q-statistics

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	0.308	0.308	3.8098	0.051
		2	-0.238	-0.368	6.1388	0.046
		3	-0.106	0.138	6.6142	0.085
		4	-0.061	-0.202	6.7778	0.148
		5	-0.157	-0.085	7.8883	0.163
		6	-0.180	-0.172	9.3928	0.153
		7	-0.056	-0.019	9.5448	0.216
		8	0.112	0.043	10.171	0.253
		9	0.138	0.031	11.159	0.265
		10	-0.148	-0.283	12.325	0.264
		11	-0.369	-0.291	19.878	0.047
		12	-0.084	0.001	20.286	0.062
		13	0.149	-0.043	21.621	0.062
		14	0.138	0.114	22.821	0.063
		15	0.103	-0.028	23.512	0.074
		16	0.123	0.002	24.550	0.078

Correlograms of Squared Residuals

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	0.200	0.200	1.6038	0.205
		2	-0.072	-0.116	1.8150	0.404
		3	-0.049	-0.010	1.9168	0.590
		4	-0.191	-0.196	3.5050	0.477
		5	-0.143	-0.072	4.4242	0.490
		6	0.028	0.038	4.4598	0.615
		7	0.222	0.200	6.8306	0.447
		8	0.005	-0.122	6.8318	0.555
		9	-0.196	-0.201	8.8150	0.455
		10	-0.105	-0.048	9.4056	0.494
		11	0.004	0.107	9.4063	0.584
		12	-0.116	-0.132	10.184	0.600
		13	-0.052	-0.116	10.346	0.665
		14	0.035	-0.086	10.422	0.731
		15	-0.129	-0.119	11.510	0.716
		16	-0.113	-0.023	12.380	0.717

Source: Eviews

Table A6. Cointegration test: GDP, AID, Policy, SE for models 12, 13, 14 in table 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.843648	127.9030	95.75366	0.0001
At most 1	0.497654	61.09982	69.81889	0.2031
At most 2	0.405354	36.31507	47.85613	0.3807
At most 3	0.277961	17.60266	29.79707	0.5955
At most 4	0.150150	5.878334	15.49471	0.7099
At most 5	0.000591	0.021298	3.841466	0.8839

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.843648	66.80314	40.07757	0.0000
At most 1	0.497654	24.78475	33.87687	0.3997
At most 2	0.405354	18.71241	27.58434	0.4370
At most 3	0.277961	11.72433	21.13162	0.5751
At most 4	0.150150	5.857036	14.26460	0.6316
At most 5	0.000591	0.021298	3.841466	0.8839

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Source: Eviews