Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Thriving Despite Corruption: A Reconciliation of the Empirical Literature

Munachiso Victor Ifechukwu

ifechukwumunachiso5@gmail.com

Centre for the Study of the Economies of Africa

Research Article

Keywords: political economy, resource allocation, economic growth, political corruption, rent seeking, institutional economics

Posted Date: June 17th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9915812/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Thriving Despite Corruption: A Reconciliation of the Empirical Literature

Munachiso Victor Ifechukwu

Centre for the Study of the Economies of Africa (CSEA)
ifechukwumunachiso5@gmail.com.

Abstract

This paper resolves the long-standing empirical inconsistency in the corruption-growth literature. By reconceptualising corruption as a resource reallocation mechanism across various sectors, driven by powerful groups, we show that both the 'grease the wheel' and 'sand the wheel' hypotheses are correct in different contexts. Specifically, if corrupt groups allocate resources towards growth-enhancing objectives, corruption will increase growth and vice versa. Applying this framework to the Nigerian natural rubber industry (1961-2024) with structural break tests and robust regressions, we find that executive corruption reduced rubber production by 649.8 thousand tonnes between 1961 and 1987, increased it by 379.5 thousand tonnes between 1988 and 2008, and had relatively little effect between 2009 and 2024. Given the inconsistency in the impact of corruption in one sector, we establish that corruption's impact on growth or development is unstable but can be positive if the corrupt group's interests align with developmental objectives. An alignment of interests will then drive resource allocations to the requisite sectors and hence development. Nonetheless, corruption cannot be beneficial to all social objectives.

Keywords: political economy, resource allocation, economic growth, political corruption, rent seeking, institutional economics

JEL Classification: D27, D73, O43, O17, D02, P16

1. Introduction

Does corruption grease or sand the wheels of economic growth? The empirical literature reveals conflicting answers. While some find that corruption has positive impacts or 'greases the wheels' of economic growth (Heo et al. 2021; Méon and Weill 2010), others find that corruption has negative impacts or 'sands the wheels' of economic growth (Uddin and Rahman 2023; Uberti 2022)- and these discrepancies persist across contexts. Regionally, corruption is beneficial in Latin America and the Middle East and North Africa (MENA), though

detrimental elsewhere (Spyromitros and Panagiotidis 2022). At a country level, even within Latin America, Bolivia and Chile have positive impacts, Colombia has insignificant impacts, and Brazil and Peru have negative impacts (Urbina and Rodríguez 2021), with similar variations across countries in Asia and Europe (Kargin-Akkoc and Durusu-Ciftci 2024; Huang 2016). Moreover, even within the same country, the effect of corruption varies with time (Forson 2024).

Explanations for these inconsistencies centre on institutional contexts. Corruption is found to be helpful for growth in countries with heavy entry regulations (Dejardin and Laurent 2024), under autocracies (Saha and Sen 2021), and with moderate levels of corruption (Trabelsi 2024). Theoretically, De Vaal and Ebben (2011) finds corruption to be beneficial with inefficient institutions and Wawrosz (2022) argues that corruption is synonymous with an undesirable redistribution which are influenced by institutions. In fact, corruption supports growth in developing countries but retards growth in developed countries (Elsayed and Mandikiana 2026). Nonetheless, some of these explanations themselves are inconsistent. Institutions that might encourage a positive impact on corruption in one context might discourage it in another. Corruption has also been found to be detrimental in autocracies (Assiotis and Sylwester 2014), and at moderate levels of corruption (Nguyen et al. 2022). This paper provides an alternative viewpoint that resolves the inconsistencies in the literature.

In this paper, we unify the institutional school of corruption and a variant of the redistribution systems school suggested by Wawrosz (2022). Specifically, referring to *reallocation* or redistribution across sectors and power dynamics, we account for both schools of thought. We also apply this new unified theory to the empirical puzzle of corruption's impact and show that both the 'grease the wheel' and 'sand the wheel' hypotheses are correct under different conditions. More importantly, using the Nigerian rubber industry as a case study, we provide empirical and historical evidence to suggest that the impact of corruption is unstable. Thus, we reconcile the empirical inconsistencies in the literature. Additionally, given the impossible nature of eliminating corruption completely (Wawrosz 2022), we suggest means to thrive despite it.

This paper is structured as follows: Section 2 provides a detailed theoretical exposition of the impact of corruption on growth. Section 3 outlines the methodology, and Section 4 presents the results, which are discussed in Section 5. Section 6 then concludes.

2. Model

2.1. Definitions

The literature is undecided on the definitions of corruption, with definitions dependent on cultural background, political leaning and discipline (Gyimah-Brempong 2002). To provide a foundation for our framework, Jain (2001) defines corruption as the use of public power for private benefit, in an unlawful manner. However, this definition does not account for the possibility of legal corruption or unjust activities that are not clearly illegal (Dincer and Johnston 2020). As a result, this study adopts a reduced version of Jain's: Corruption is the use of public power for private benefit. We remove the second portion to consider both legal and illegal corruption. In addition to its broad scope, this new definition provides both the necessary and sufficient conditions for corruption.

The necessary condition for corruption is power; only those with power can redirect benefits. This power explains the results of Davis et al. (2024) as well as why corruption is difficult to curtail. Powerful groups can either capture the anti-corruption measures (Ejiogu et al. 2021), or find ways around it (Olken and Pande 2012). This makes anti-corruption difficult and highly expensive (Aidt 2003), with corruption vanishing only in an inhumane society (Wawrosz 2022). This is not to say that all powerful groups are corrupt. Some of them are honest. However, the option to be corrupt is only available to the powerful. The sufficient condition establishes the difference between the two.

The sufficient condition for corruption is that the powerful group allocates resources for their private benefit, ignoring the relatively weak members of the public or in opposition to the interests of the weak. Given that weak members of society only get resources assigned to them by the powerful, resources can thus be divided amongst the corrupt and honest but powerful groups. Societal outcomes are thus defined by the actions of these powerful groups (Kabeya 2025; Khan 2010). It is plausible for one powerful group to consolidate power, constituting a 'potential development coalition'(Khan 2010). In this case, societal outcomes are defined by that singular group, either corrupt or honest. However, we focus our attention on the case in which both groups are somewhat powerful and jointly shape societal outcomes, with power identified by the proportion of resources they control.

2.2. A basic model

Assuming that an economy has one fixed resource r at a given point in time, we observe the case of one of its social objectives or sectors, $J(r,c)$ represented by the resources allocated towards it. As per the previous section, two groups of powerful actors, the honest and the corrupt, determine how resources are allocated. Institutions are used as channels for this resource allocation. The social objective is thus represented by:

$$J(r,c) = \beta r(1-\tau c) + \rho r\tau c \qquad (1)$$

Where $\beta \in [0,1]$ is the portion of resources controlled by the honest group, $r(1-c)$, allocated towards the objective; $c \in [0,1]$ is the proportion of r controlled by the corrupt group[1]; and $\rho \in [0,1]$ is the proportion of resources controlled by the corrupt group cr that is directed towards the social objective. $J(r,c)$ and r are of the same unit, and $J(r,c) < r$ to accommodate other objectives. Additionally, taking into account the sector or objective specific nature of corruption (Sotola and Pillay 2022), $\tau \in [0,1]$ represents the proportion of corruption relevant to the objective. As per the definitions, $\rho = f(\theta_p)$ and $\beta = f(\theta_p, \theta_w)$, where θ_p and θ_w represent the interests of the powerful and weak respectively. We assume a closed economy[2], and as such, the corrupt group must spend its resources within the economy, allowing for $\rho > 0$. In this form, the social objective function accommodates both the beneficial and detrimental aspects of the literature. With minor algebraic manipulations, we obtain:

$$J(r,c) = \beta r + (\rho - \beta) r\tau c \quad (2)$$

Proposition 1: The impact of corruption on social objective $J(r,c)$ is determined by ρ and β, where $\rho \neq \beta \; \forall \; \rho, \beta$.

***Proof**: Differentiating equation (2) w.r.t c, we obtain:*

$$\frac{dJ(r,c)}{dc} = (\rho - \beta)\tau r \quad (3)$$

Since $r \geq 0$, and $\tau \in [0,1]$, the impact of corruption on society would be positive if the $\rho > \beta$ and negative if $\rho < \beta$. In words, corruption is beneficial w.r.t $J(r,c)$ if it allocates more resources towards the objective than in its absence. Thus, this model accommodates the empirical findings of De Vaal and Ebben (2011) *that corruption might be useful in otherwise inefficient societies. If $\rho = \beta$, then corruption would have no impact w.r.t $J(r,c)$ as the honest and corrupt groups direct resources in similar ways. In fact, as per the sufficient condition for corruption, if $\rho = \beta$, corruption does not exist as it would imply the corrupt group acting in the interest of the weak, which is only remotely if at all possible* (Olken and Pande 2012; Aidt 2003). ■

2.3. Multiple Social Objectives

In the foregoing analysis, we examined only one objective of society. However, a society might allocate some of its resources to defence or environmental protection or even political decentralisation, as in pre-colonial Africa (Henn and Robinson 2025). Modifying equation (1) to N social objectives with one resource r and corruption rate c, we have:

$$\boldsymbol{J}(r,c) = \boldsymbol{\beta} r(1-\boldsymbol{\tau} c) + \boldsymbol{\rho} r \boldsymbol{\tau} c \quad (4)$$

Where $\boldsymbol{J}(r,c) = [J_1, J_2, J_3 \ldots J_N]$ contains all social objectives, $\boldsymbol{\beta} = [\beta_1, \beta_2, \beta_3, \ldots, \beta_N]$ represents the honest resource allocation set agreed upon by society, and $\boldsymbol{\rho} = [\rho_1, \rho_2, \rho_3, \ldots \rho_N]$ is the allocation set of corruption's beneficiaries. Additionally, $\boldsymbol{\tau} = [\tau_1, \tau_2, \tau_3, \ldots, \tau_N]$ where $\sum_{n=1}^{N} \tau_n = 1$ since all the sectors or objectives are exposed to all the corruption. Let J_1, J_2 be two social objectives, say defence and production of food, respectively. β_1, β_2 becomes the portion of resources assigned by the powerful, honest group to these goals, and ρ_1, ρ_2 are the portions allocated to these two objectives by the corrupt group. Furthermore, $\sum_{n=1}^{N} \beta_n$, $\sum_{n=1}^{N} \rho_n = 1$ and $\sum_{n=1}^{N} J_n = r$, where J_n is henceforth used to refer to $J_n(r,c)$, since all resources are used for all objectives by default.

Proposition 2. If $\rho_1 > \beta_1$ and $\rho_2 > \beta_2$, then for some other objective(s) n, $\rho_n < \beta_n$.

[1] This formulation can be applied to any type of corruption see Nur-tegin and Jakee (2020), and Otusanya (2011).

[2] We relax this assumption in Appendix A

***Proof**: Consider a case where corruption is much more beneficial in achieving the two goals. In this case $\rho_1 > \beta_1$ and $\rho_2 > \beta_2$. However, since $\sum_{n=1}^{N} \beta_n$, $\sum_{n=1}^{N} \rho_n = 1$ then for some other objective(s) n, $\rho_n < \beta_n$. That is corruption might be beneficial for some objectives but never all.* ■

2.4. The Case of Production and 'General Objectives'

In the previous discussions, we have shown that corruption reallocates resources. In this section, we relate this to output. We motivate our analysis with the following equation:

$$dY = \sum_{n=1}^{N} \frac{\partial Y}{\partial J_n} dJ_n \quad (5)$$

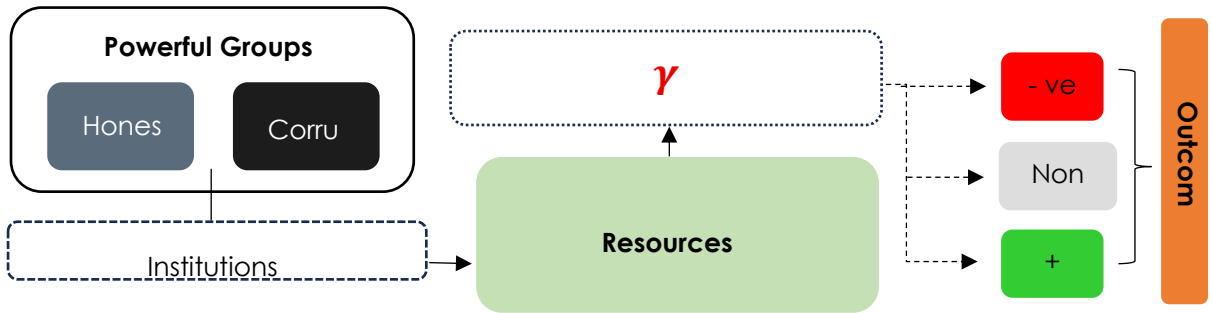
Where the change in J_n is denoted dJ_n, dY is the change in total output $Y = \sum_{n=1}^{N} Y_n$, and $\frac{\partial Y}{\partial J_n}$ which we henceforth denote as γ_n, refers to the contribution of dJ_n to dY. Although an economy might allocate ample resources to one sector, its contribution to output depends on γ_n which is in turn due to a variety of factors, both controllable and uncontrollable. For example, agriculture might be more impactful with good weather or technological advancement, while oil production might be less impactful in the event of a blowout. Across both cases, one fact is that γ_n is dependent on various other factors, exogenous to our model, and which can usually only be determined after the resources have been allocated. Nonetheless, dividing equation (5) by dc or a change in corruption, and repeating equation (3) with multiple social objectives, we obtain the two primary equations of our model:

$$\frac{dJ_n}{dc} = (\boldsymbol{\rho} - \boldsymbol{\beta})\boldsymbol{\tau} r \quad (6)$$

$$\frac{dY}{dc} = \sum_{n=1}^{N} \gamma_n \frac{dJ_n}{dc} \quad (7)$$

Together, they show that while corruption reallocates resources from one objective to another, its impact on the economy (change in output) depends on the contribution of the prioritized objective to production. In combination with Proposition 2, if corruption prioritises objectives that encourage growth or increased production, it neglects objectives that would, say, reduce inequality or reinforce environmental protection. For example, the economic miracles of the US, Japan, Italy, South Korea, and China, as per Popa (2021), Tassinari et al. (2019), and Huntington (1968, 59), which were aided by corruption[3], create the problem of environmental sustainability (Bimonte and Stabile 2019; Kim 2006). Obviously, this rests on the assumption that the 'general objectives' of reduced inequality, environmental protection, and increased production do not share social objectives[4]. Even when social objectives are mutually exclusive, some social objectives might help in achieving multiple general objectives. For example, corruption's resource allocation can lead to both economic development and reduced inequality through the informal sector, especially in low-income countries (Wong 2025). However, with increased economic development, corruption reinforces inequality while encouraging production (Parsons and Rabhi 2025; Wong 2025). This emphasises the importance of context and time when dealing with corruption. We provide a conceptual framework of the model in Figure 1 below. Powerful groups use institutions to allocate resources, which affects outcomes based on γ.

Figure 1. Conceptual Framework



[3] Apparently, corruption is useful if rapid achievement of an objective is important.

[4] We define a general objective as an objective whose outcomes are based on achievement of other objectives. Note that this definition is flexible, given that a specific objective for overall production can also be a general objective. For example, while agriculture is a specific objective to overall production, it is a general objective to farm labour inputs or farm equipment's.

Source: Authors' own work

3. Methodology

3.1. Empirical Strategy

Given that corruption's impact is both sensitive to time and context (Forson 2024; Sotola and Pillay 2022), we focus on one sector, while accounting for structural breaks. Particularly, we examine the Nigerian natural rubber production industry between 1961 and 2024. In focusing on one sector, equations (6) and (7) which are the primary equations collapse to the following:

$$\frac{dY_n}{dc} = \gamma_n(\rho_n - \beta_n)\tau_n r \quad (8)$$

Where subscript n refers to the rubber industry and equation (8) is obtained by substituting equation (6) in equation (7) and focusing on one industry[5]. The empirical model applied in this paper is presented as:

$$\text{rubber}_t = \alpha_0 + \alpha_1 \text{execorr}_t + \sum\delta_{1,i}\text{regime}_i + \sum\delta_{2,i}(\text{regime}_i \times \text{execorr}_t) + \varepsilon_t$$

Where α_1 represents $\gamma_n(\rho_n - \beta_n)\tau_n r$ in equation (8), $\delta_{2,i}$ captures changes in different regimes. While the structural break tests of Ditzen et al. (2025) are used to obtain the dummy variable regime the data used in this analysis are described in Table 1 below.

Table 1. Data

Variable	Description	Source
Rubber production (rubber)	Natural rubber in primary forms (tonnes)	Food and Agriculture Organisation of the United Nations [FAO] (2025)
Executive corruption (execorr)	Executive corruption (v2x_execorr)	V-Dem v16 indices (Coppedge et al. 2026)
Rainfall (rain)	Annual precipitation (millilitres)	World Bank, Climate Change Knowledge Portal (2024)
Rubber price (price)	Ribbed Smoked Sheets (RSS3) prices ($/kg)	World Bank Prospects Group (2025)

Source: Authors' own work. Note: Rainfall data was for 1961 to 2022.

We apply the V-Dem corruption indices for three reasons: its greater reliability and validity (McMann et al. 2022), sufficient temporal scope and its consideration for multiple types of corruption. In making use of the third advantage, we consider executive corruption given the executive arm of governments' overwhelming influence in Nigerian politics (Kifordu 2010). Nonetheless, we use this measure cautiously for lack of a better alternative. We verify the robustness of our results in controlling for rainfall and price as per Song et al. (2026) as well as through robust regression techniques. In allowing for these additional factors, we consider variables that might influence γ_n and offer some support for our model. The table of descriptive statistics is presented in Table 2 below.

Table 2. Descriptive Statistics

Variable	Observations	Mean	Std. dev.	Min	Max
rubber	64	81.3702	32.2931	45	155
execorr	64	.8887	.0204	.83	.939
rain	63	1083.683	110.1867	770.75	1319.71
price	64	1.2571	.8545	.3318	4.8232

Source: Authors' own work.

3.2. Case Selection: Why Nigerian rubber and why 1961-2024

The Nigerian natural rubber production industry is particularly interesting for two reasons. First, the Nigerian rubber industry has been exposed to two different corrupt regimes. One under the marketing boards (Otusanya and Lauwo 2019) and another under the 'rubber barons' or large rubber estates (von Hellermann 2013, 66-

[5] Given that r is interpreted in real terms upon entering the economic system, and all other terms on the right-hand side of equation 8 are unitless, the right-hand side can be represented in real terms, the same as Y_n.

68,153). This allows for a comparison of corruptions impact between different corrupt regimes. Second, the rubber industry experiences a regime without marketing boards or rubber barons. This allows for a discussion of an 'honest' period. We establish the points of these regime changes through the structural break test of Ditzen et al. (2025), tracing them to policy changes. Following Knights (2021), we then apply historical analysis to our discussions of these regimes.

4. Results

4.1. Pre-estimation Tests

We apply two sets of stationarity tests. First, we consider the widely used Phillips-Perron test (PP) unit root test under the assumption of zero structural breaks (Phillips and Perron 1988). Second, we apply the Clemente-Montañés-Reyes (CMR) stationarity test under the assumption of two breaks in both the Additive Outlier (AO) and Innovative Outlier (IO) models (Clemente et al. 1998). We conduct the second stationarity test because, in the presence of breaks, stationarity tests, including the Phillips-Perron, might be erroneous (Baum 2005). The results of our stationarity tests are presented in Table 3 below. While rain is stationary across all tests, execorr is only stationary by the PP test. rubber and price, on the other hand, are stationary by the CMR-IO test.

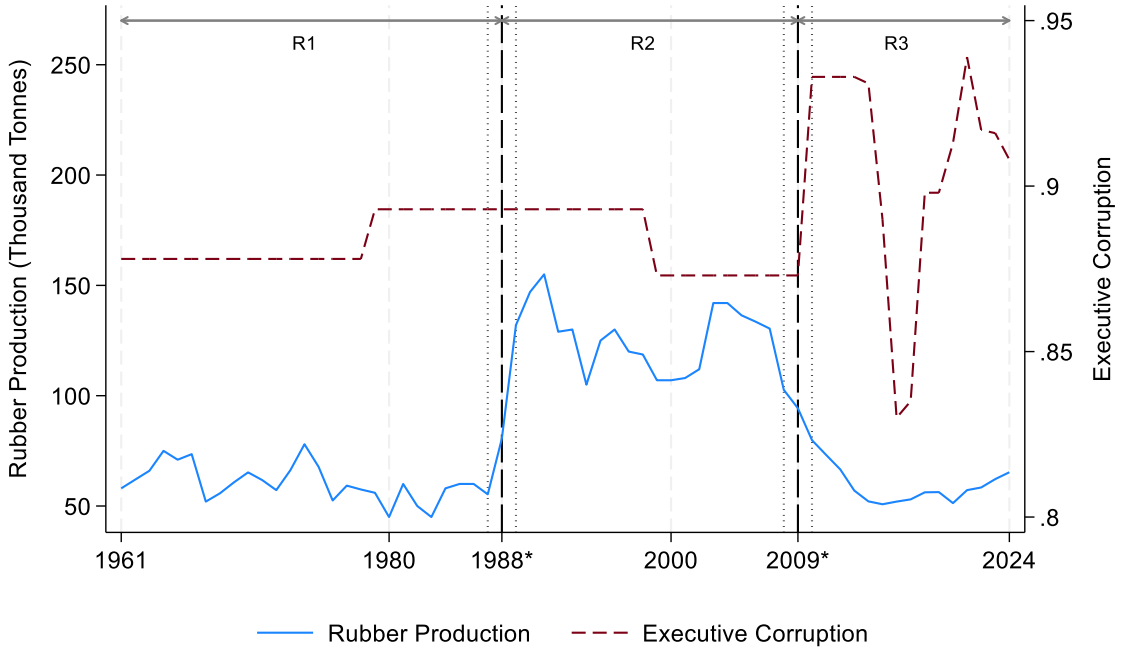
Table 3. Stationarity Test Results

	Phillips-Perron	**Clemente-Montañés-Reyes**				
		Additive Outlier		Innovative Outlier		
Variable	t-stat	t-stat	Breaks	t-stat	Breaks	**Decision**
rubber	-1.8394	-5.367	1985, 2009	-6.772**	1986, 2008	I(0)†
execorr	-3.425**	-1.005	2009, 2017	-1.270	2008, 2018	I(0)‡
rain	-5.5723***	-6.332**	1964, 1997	-7.533**	1965, 1982	I(0)
price	-1.9278	-2.542	2007, 2013	-6.109**	2004, 2010	I(0)†

Source: Authors' own work. Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.† Stationary under CMR-IO model accounting for structural breaks. ‡ PP preferred given that neither the CMR-AO or CMR-IO show twin significant breaks. All other break dates were significant at the 5% level.

4.2. Regression Results

Figure 2. Regimes of corruption in the Nigerian natural rubber production industry.



Source: Authors' own work. Note: * breakpoint years, with 95% confidence intervals. R1, R2, and R3 represent regimes.

From Figure 2 above, in R1, rubber production was low, with high levels of executive corruption. In R2, with somewhat stable levels of executive corruption, production is higher. In R3, production declines with higher variation in executive corruption levels. The breakpoint years are 1988 and 2009, with confidence intervals of 1987 and 1989, and 2008 and 2010, respectively.

Accounting for these breaks we present our regression results in specification (1) of Table 4. We find divergent impacts across multiple regimes. In this specification, a one unit increase in executive corruption in regime 1 (1961-1987), reduces rubber production by 595.7 thousand tonnes and is significant at the 1% level. In regime 2 (1988-2008), an increase in executive corruption presents a 727.8 thousand tonne increase relative to the decline in R1, significant at the 10% level. Accounting for R1, this sums up to a positive 132.1 thousand tonne increase for a unit increase in executive corruption in R2. In R3 (2009-2024), a unit increase in executive corruption leads to a 645.7 thousand tonne increase in rubber production relative to R1, significant at the 1% level. This amounts to a 50 thousand tonne increase in rubber production per unit of executive corruption in R3.

In specification (2) of Table 4, we account for additional factors in line with Song et al. (2026). While the signs of our core variables do not change, the magnitudes vary. Executive corruption in R1, reduces rubber production by 649.8 thousand tonnes. In R2 and R3, the impact of executive corruption now amounts to 379.5 and -37.5 thousand tonnes, respectively. In all regimes, executive corruption was significant at the 5% level. As per equation (8), the inclusion of rubber prices and rainfall, which influence γ_n, in specification (2) affects the magnitude but not the signs – except in R3 which was relatively small. In both R1 and R3 the inclusion of the controls reduced executive corruption's impact, while it increased corruption's impact in R2.

Table 4. Regression results (Dependent variable: Rubber Production, Thousand Tonnes)

	OLS regression		Robust regression	
	(1)	(2)	(3)	(4)
Executive Corruption	-595.7***	-649.8**	-213.2	-682.8**
	(-3.26)	(-2.56)	(-0.89)	(-2.59)
Regimes				
R2	-579.5	-847.9**	-1032.41***	-870.1**
	(-1.52)	(-2.36)	(-4.44)	(-2.01)
R3	-570.0***	-547.0**	-239.36	-615.7**
	(-3.16)	(-2.32)	(-1.09)	(-2.61)
Interaction terms				
R2 * Executive Corruption	727.8*	1029.3**	1234.91***	1052.7**
	(1.68)	(2.52)	(4.70)	(2.16)

R3 * Executive Corruption	645.7***	612.3**	265.90	681.2**
	(3.19)	(2.31)	(1.08)	(2.55)
Controls				
rain		-0.0383**		-0.0270*
		(-2.60)		(-1.97)
price		4.890*		7.647***
		(1.86)		(3.15)
Constant	586.4***	672.1***	247.81	687.3***
	(3.62)	(3.11)	(1.16)	(3.05)
Prob>F	5.56e-20	3.70e-23	0.0000	1.51e-26
R2	0.853	0.872		
Pseudo R2			0.278	0.524
Ramsey RESET	0.3596	0.2213		
Hausman test			0.0007	0.00897

Source: Authors' own work. Note: *t*-statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ with robust standard errors. For Ramsey RESET and Hausman test, only *p*-values are reported. The Hausmann test for specification (3) is "S against LS" while its "MM against S" in specification (4).

To account for the possibility of outliers influencing these results, we consider the MM estimation (Yohai 1987) in addition to the S estimation (Rousseeuw and Yohai 1984). While the S estimation is robust to outliers, its efficiency is improved with the MM technique (Dehon et al. 2009; Maronna et al. 2006). Although the S and MM robust estimation results are provided in Appendix B, Table 4 displays the most relevant estimates from the respective Hausman tests. While specification (3) refers to the S estimation, specification (4) refers to the MM estimation. Notably, even though the signs remain consistent, the magnitudes change in the robust estimations. This is most obvious in specification (3). Amongst the interactions in this specification, only the R2 interaction term is significant, amounting to a 1021.71 thousand tonne (1234.91--213.2) increase in rubber production from an increase in executive corruption. Controlling for other variables with specification (4), this sum reduces to 329.9 thousand tonnes (1052.7--682.8), which is close to our OLS estimates. This suggests that the control variables were responsible for the outliers detected through the Hausman test of specification (3). We provide historical support for these findings in the next section.

5. Discussion

From the CMR-IO stationarity tests in Table 3, rubber production breaks in 1986 and 2008. Consistent with the fact that the IO model captures policy driven changes, these dates correspond to the introduction of the Structural Adjustment Programme (SAP) and the final exit of the rubber barons due to the 2006 import tariffs. The closeness of these dates to the breakpoints in corruptions' impact established by structural break test of Ditzen et al. (2025) suggests a relationship between these policy changes and the changes in corruptions' impact. Applying historical analysis (Knights 2021), we relate these policies to the results in Table 4.

In R1, or the pre-SAP period, the constitutionally empowered rubber market boards, controlled a large portion of resource allocations within the rubber industry. In other words, they were the more powerful actors within the Nigerian rubber sector. Although created for the purposes of helping farmers, the rubber marketing board had been reallocating resources from the rubber industry to private or political use (Otusanya and Lauwo 2019), while providing an insufficient amount of input to the rubber farmers (Ojo 1989). In terms of equation (8), $\rho_n < \beta_n$. This is consistent with the negative effects of executive corruption on rubber production in Table 4. The introduction of the SAP disbanded the marketing boards, while distributing the resources towards the private sector as part of a broader objective of improving efficiency (Adeoye 1991).

This disbandment ushered in R2, or the SAP era as well as the rise of the Nigerian 'rubber barons'. The SAP resulted in increased domestic demand for rubber (Akinlo 1996), which prompted the major domestic consumers, tyre manufacturers (Aubrat 1988), to acquire or expand their ownership of rubber farms. Michelin and Dunlop were the two major tyre manufacturers or rubber consumers (Aubrat 1988). While Michelin acquired additional farms in 1988 and 1996 (Ojuola 2015), in 1991, Dunlop acquired its own plantation (Alos 2000). In many cases, corruption or crony capitalism allowed for the allocation of land without consideration for the weak, who were often female villagers (von Hellermann 2013, 66–68, 153; World Rainforest Movement 2009). In other words, executive corruption reallocated resources towards rubber production through the tyre manufacturers or rubber (*robber*) barons. Relating to equation (8), $\rho_n > \beta_n$. The positive effects of executive corruption on rubber production in Table 4, even after accommodating R1 impacts, supports this account.

Although the activities of the rubber barons continued to 2008, its golden years ended in 2006. In 2006, as part of Nigeria's commitments to the ECOWAS Common External Tariff (CET) import tariffs on tyres were reduced

from 40% to 10%, resulting in cheaper imports and a lack of competitiveness for domestic tyre manufacturers. Whilst the presidency was initially inclined to protectionism, over time, political considerations and the pressures from technocrats changed the president's position (Okonjo-Iweala 2012, 61–65; Ajayi and Osafo-Kwaako 2009). Though indirectly, this is synonymous with an honest reallocation for two reason. First, the technocrats moved the motion for the purpose of free trade in the interest of citizens – hence honest. Second the resources allocated towards rubber production in R2 became less used given the closure of tyre manufacturing plants and a fall in demand for local rubber. Michelin closed in December 2006 followed by Dunlop in 2008 leading to a reallocation of the resources for other purposes. The closure of the last rubber baron coincides with the second break year in Table 3 as well as the second breakpoint in Figure 2. Across all specifications in Table 4, the relatively small impact of executive corruption in R3 after accounting for R1 supports the historical evidence.

If the impact of corruption on one sector is this unstable over a long period of time, and by equation (7), the impacts of corruption on the economy or production is a γ_n weighted sum of its impact on multiple sectors, it follows that corruption's impact on the economy is not a stable parameter. To further confound the instability, the various sectors are subject to varying types of corruption (Nur-tegin and Jakee 2020). This explains the findings of Forson (2024) as well as the inconsistencies in the empirical literature. Empirical findings to support the 'grease the wheel' or 'sand the wheel' hypotheses represent varying periods where corrupt individuals or groups reallocated resources towards or away from beneficial sectors for production. In other words, both schools are correct depending on the time, behaviours of the corrupt and the type of corruption considered.

Our discussion also highlights the importance of power in the analysis of corruption's impact. Across the regimes, power remained with the executive who then mobilised resources through various institutions like the commodity boards, the rubber barons and trade supporting institutions. In all cases, the executive wielded its power for its own interests. While in R1, it was partly for sponsoring party expenditures, in R2 it was mainly crony capitalism, and in R3 it was partly for political considerations. Nonetheless, relating to the objective, we find that when the interests of the powerful corrupt coincide with the success of an objective, as in R2, corruption tends to support the objective. This suggests that it is possible to thrive despite corruption, if the interests of the powerful corrupt are considered during industrial policy planning- especially if uncontrollable factors turn out well.

Our findings are congruent with the existing attempts to resolve the empirical inconsistencies in corruptions' impact. Corruption is found to be helpful for growth in countries with heavy entry regulations (Dejardin and Laurent 2024), under autocracies (Saha and Sen 2021), and with moderate levels of corruption (Trabelsi 2024). In countries with heavy entry regulations and autocracies, the powerful, being sufficiently confident in their power, can allocate resources towards long-term objectives, which include growth (Khan 2010)**.** Furthermore, the impacts of moderate levels of corruption still depend on what the corrupt do[6]. Even in autocracies or at moderate levels, where corruption is detrimental (Assiotis and Sylwester 2014; Nguyen et al. 2022) our model remains consistent. In these contexts, the corrupt simply prefer to allocate resources towards objectives that aren't beneficial to growth. However, while the literature attributes the discrepancies to specific institutional characteristics, we extend our discussions to the power that commands the institutions and combine historical and econometric analysis. Our discussions show the advantage of combining historical with econometric analysis. While empirical analysis can capture the effects of executive corruption, historical analysis provides contextual information about the factors at play in equation (8).

Limitations and Future Research

Nonetheless, our analysis suffers from one major limitation. Given the secrecy of corruption (Olken 2009), both the historical and empirical analyses cannot give a full or perhaps completely accurate view of corruption. We hence caution against an overly confident application of this analysis in a world of strictly imperfect information. However, the generality of this model may be exploited for future research. Specifically, given the number of distinctive characteristics by which powerful groups might be divided, and the multiplicity of possible objectives, the impact of those characteristics on any given objective can be assessed. One particularly interesting line of research might be on executive corruption or the educational attainment of government officials and the

[6] From equation (2), with a moderate or 50% level of corruption, we have: $J(r,c) = \beta r + (\rho - \beta) r\tau(0.5)$. It follows that equation (3) and Proposition (2) holds.

Sustainable Development Goals. Perhaps it would be found that things are more practical at the micro level and that "*everything stays, but it still changes*".

6. Conclusion

Corruption remains an inevitable part of human society, with impacts on economic outcomes that are neither inherently deterministic nor uniformly destructive. By reconceptualising corruption as a reallocation mechanism across sectors driven by powerful groups, we reconcile the longstanding empirical inconsistencies in corruption's impacts, especially on growth. Our analysis shows that both the 'grease the wheels' and 'sand the wheels' hypotheses are correct depending on whether corrupt groups reallocate resources towards or away from growth-enriching objectives. Using the Nigerian rubber industry as a case study, we find that corruption had a positive impact on rubber production when it was carried out by rubber barons whose private interests coincided with expansion (R2). In other cases, corruption proved detrimental when the marketing boards siphoned resources (R1) and ambiguous but small following restructuring (R3). Crucially, the instability of corruption's impact on a sector across regimes reflects the empirical inconsistencies in the literature as well as the significance of interest alignments. Corruption can lead to positive developmental outcomes if only the interests of the corrupt group can be made to align with developmental outcomes.

Appendices

Appendix A: The Open Economy

Most economies in today's day and age are necessarily open. If we relax the closed economy implicit assumption, corrupt groups might export funds or import funds (Cieślik and Goczek 2018; Otusanya and Lauwo 2012). In terms of resource flows the former is a resource inflow while the latter is a resource outflow. To introduce this to our model, we note that in relation to any given social objective $J(r,c)_n$ some resources are pulled from abroad, while some resources could be sent abroad. Keeping equation (1) in terms r and $J(r,c)$, while adjusting for resource flows, we obtain:

$$J(r,c) = \beta^d r(1-c) + \beta^{in} r(1-c) - \beta^{out} r(1-c) + \rho^d cr + \rho^{in} cr - \rho^{out} cr$$

Where superscripts out and in refer to resource outflow and inflow and d is domestic, respectively. If $\boldsymbol{\rho}^{out} > \boldsymbol{\beta}^{out}$, corrupt groups export more resources than the honest, with a similar condition for resource imports. Rearranging in terms of equation (2):

$$\frac{J(r,c)}{r} = (\beta^d + \beta^{in} - \beta^{out}) + (\rho^d + \rho^{in} - \rho^{out} - (\beta + \beta^{in} - \beta^{out}))c \quad (4)$$

Which extends to the general case as:

$$\frac{\boldsymbol{J}(r,c)}{r} = (\boldsymbol{\beta}^d + \boldsymbol{\beta}^{in} - \boldsymbol{\beta}^{out})(1-c) + (\boldsymbol{\rho}^d + \boldsymbol{\rho}^{in} - \boldsymbol{\rho}^{out})c \quad (5)$$

$$\frac{\boldsymbol{J}(r,c)}{r} = (\boldsymbol{\beta}^d + \boldsymbol{\beta}^{in} - \boldsymbol{\beta}^{out}) + \left(\boldsymbol{\rho}^d + \boldsymbol{\rho}^{in} - \boldsymbol{\rho}^{out} - (\boldsymbol{\beta}^d + \boldsymbol{\beta}^{in} - \boldsymbol{\beta}^{out})\right) c \quad (6)$$

$$\frac{\boldsymbol{J}(r,c)}{r} = \boldsymbol{\beta} + (\boldsymbol{\rho} - \boldsymbol{\beta})c \quad (7)$$

Thus, to obtain $\boldsymbol{\beta}^d, \boldsymbol{\beta}^{in}, \boldsymbol{\beta}^{out}$ we first estimate equation (7) and then estimate the following adjustment equations:

$$\frac{\boldsymbol{J}^{in}(r,c)}{r} = \boldsymbol{\beta}^{in}(1-c) + \boldsymbol{\rho}^{in} c$$

$$\frac{\boldsymbol{J}^{out}(r,c)}{r} = \boldsymbol{\beta}^{out}(1-c) + \boldsymbol{\rho}^{out} c$$

Then we make the following adjustments to the coefficients of equation (7): $\boldsymbol{\beta} - \boldsymbol{\beta}^{in} + \boldsymbol{\beta}^{out} = 1$ and $\boldsymbol{\rho} - \boldsymbol{\rho}^{in} + \boldsymbol{\rho}^{out} = 1$. That is subtracting the inflow of resources and adding the outflow.

Appendix B: Robust Regression Results

Dependent variable: Rubber Production, Thousand Tonnes

	Without controls		With controls	
	S	MM	S	MM
Executive Corruption	-213.2	-547.4**	-156.0	-682.8**
	(-0.89)	(-2.56)	(-0.76)	(-2.59)
Regimes				
R2	-1032.41***	-1185.4***	310.3	-870.1**
	(-4.44)	(-3.23)	(1.34)	(-2.01)
R3	-239.36	-576.8***	-164.4	-615.7**
	(-1.09)	(-2.89)	(-0.88)	(-2.61)
Interaction terms				
R2 * Executive Corruption	1234.91***	1408.2***	-266.8	1052.7**
	(4.70)	(3.41)	(-1.02)	(2.16)
R3 * Executive Corruption	265.90	648.7***	185.7	681.2**
	(1.08)	(2.87)	(0.88)	(2.55)
Controls				
rain			-0.0267***	-0.0270*
			(-2.80)	(-1.97)
price			-5.610*	7.647***
			(-1.76)	(3.15)
Constant	247.81	543.5***	231.8	687.3***
	(1.16)	(2.88)	(1.27)	(3.05)
Prob>F	0.0000	0.0019	7.95e-49	1.51e-26
Pseudo R2	0.278	0.457	0.315	0.524
Hausman test of S against LS	0.0007		0.00127	
Hausman test of MM against S		0.150		0.00897

Source: Authors' own work. Note: *t*-statistics in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ with robust standard errors. For both Hausman tests, only *p*-values are reported. S estimation at 28.7% efficiency and MM estimation at 85% efficiency.

Declarations

Competing interests: The author has no relevant financial or non-financial interests to disclose.

References

Adeoye, A. O. 1991. 'Of Economic Masquerades and Vulgar Economy: A Critique of the Structural Adjustment Program in Nigeria'. *Africa Development / Afrique et Développement* 16 (1): 23–44.

Aidt, Toke S. 2003. 'Economic Analysis of Corruption: A Survey'. *The Economic Journal* 113 (491): F632–52. https://doi.org/https://doi.org/10.1046/j.0013-0133.2003.00171.x.

Ajayi, Kehinde, and Philip Osafo-Kwaako. 2009. 'The Adoption of the Common External Tariff in Nigeria'. In *The Politics of Trade: The Role of Research in Trade Policy and Negotiation*, edited by Diana Tussie. Studies in International Institutional Dynamics, vol. 1. Republic of Letters Publishing BV.

Akinlo, Anthony Enisan. 1996. 'The Impact of Adjustment Programme On Manufacturing Industries In Nigeria, 1986–1991: A Sample Study'. *African Development Review* 8 (1): 61–96. https://doi.org/10.1111/j.1467-8268.1996.tb00081.x.

Alos, Albert J. 2000. 'Creating Value Under Uncertainty: The Nigerian Experience'. *Journal of African Business* 1 (1): 9–24. https://doi.org/10.1300/J156v01n01_03.

Assiotis, Andreas, and Kevin Sylwester. 2014. 'Do the Effects of Corruption upon Growth Differ Between Democracies and Autocracies?' *Review of Development Economics* 18 (3): 581–94. https://doi.org/10.1111/rode.12104.

Aubrat, J. 1988. *Rehabilitation of Rubber Production in Nigeria*. Institut de Recherches sur le Caoutchouc. https://agritrop.cirad.fr/606012/1/ID606012.pdf.

Baum, Christopher F. 2005. 'Stata: The Language of Choice for Time-Series Analysis?' *The Stata Journal* 5 (1): 46–63. https://doi.org/10.1177/1536867X0500500110.

Bimonte, Salvatore, and Arsenio Stabile. 2019. 'The Effect of Growth and Corruption on Soil Sealing in Italy: A Regional Environmental Kuznets Curve Analysis'. *Environmental and Resource Economics* 74 (4): 1497–518. https://doi.org/10.1007/s10640-019-00376-1.

Cieślik, Andrzej, and Łukasz Goczek. 2018. 'Control of Corruption, International Investment, and Economic Growth – Evidence from Panel Data'. *World Development* 103 (March): 323–35. https://doi.org/10.1016/j.worlddev.2017.10.028.

Clemente, Jesús, Antonio Montañés, and Marcelo Reyes. 1998. 'Testing for a Unit Root in Variables with a Double Change in the Mean'. *Economics Letters* 59 (2): 175–82. https://doi.org/10.1016/S0165-1765(98)00052-4.

Coppedge, Michael, John Gerring, Carl Henrik Knutsen, et al. 2026. 'V-Dem [Country-Year/Country-Date] Dataset V16'. Varieties of Democracy (V-Dem) Project. https://doi.org/10.23696/VDEMDS26.

Davis, Daniel Bruno, Ronald U. Mendoza, and Jurel K. Yap. 2024. 'Corruption Risk and Political Dynasties: Exploring the Links Using Public Procurement Data in the Philippines'. *Economics of Governance* 25 (1): 81–109. https://doi.org/10.1007/s10101-023-00306-4.

Dehon, Catherine, Marjorie Gassner, and Vincenzo Verardi. 2009. 'Beware of "Good" Outliers and Overoptimistic Conclusions*'. *Oxford Bulletin of Economics and Statistics* 71 (3): 437–52. https://doi.org/10.1111/j.1468-0084.2009.00543.x.

Dejardin, Marcus, and Hélène Laurent. 2024. 'Entry-Regulation and Corruption: Grease or Sand in the Wheels of Entrepreneurship? Fresh Evidence According to Entrepreneurial Motives'. *Small Business Economics* 62 (3): 1223–72. https://doi.org/10.1007/s11187-023-00802-1.

Dincer, Oguzhan, and Michael Johnston. 2020. 'Legal Corruption?' *Public Choice* 184 (3): 219–33. https://doi.org/10.1007/s11127-020-00832-3.

Ditzen, Jan, Yiannis Karavias, and Joakim Westerlund. 2025. 'Testing and Estimating Structural Breaks in Time Series and Panel Data in Stata'. *The Stata Journal* 25 (3): 526–60. https://doi.org/10.1177/1536867X251365449.

Ejiogu, Amanze, Chibuzo Ejiogu, and Ambisisi Ambituuni. 2021. 'Corruption Fights Back: Localizing Transparency and EITI in the Nigerian "Penkelemes"'. *Governance* 34 (3): 785–802. https://doi.org/10.1111/gove.12530.

Elsayed, Nader, and Brian Washington Mandikiana. 2026. 'Corruption and Economic Growth: The Role of Country-Level Governance'. *Economic Change and Restructuring* 59 (2): 41. https://doi.org/10.1007/s10644-026-09985-5.

Food and Agriculture Organisation of the United Nations. 2025. 'Production / Crops and Livestock Products - Metadata'. December 15. https://www.fao.org/faostat/en/#data/QCL.

Forson, Joseph Ato. 2024. *Does Corruption Affect Development Outcomes Differently in Sub-Saharan Africa? Fresh Evidence from Ghana | Discover Sustainability | Springer Nature Link*. 5 (123). https://doi.org/https://doi.org/10.1007/s43621-024-00314-2.

Gyimah-Brempong, Kwabena. 2002. 'Corruption, Economic Growth, and Income Inequality in Africa'. *Economics of Governance* 3 (3): 183–209. https://doi.org/10.1007/s101010200045.

Von Hellermann, Pauline. 2013. *Things Fall Apart?: The Political Ecology of Forest Governance in Southern Nigeria*. Berghahn Books. https://doi.org/https://doi.org/10.3167/9780857459893.

Henn, Soeren J., and James A. Robinson. 2025. *Africa as a Success Story: Political Organization in Pre-Colonial Africa*. No. W34546. National Bureau of Economic Research. https://doi.org/10.3386/w34546.

Heo, Yuna, Fangfang Hou, and Seongkyu Gilbert Park. 2021. 'Does Corruption Grease or Sand the Wheels of Investment or Innovation? Different Effects in Advanced and Emerging Economies'. *Applied Economics* 53 (1): 35–60. https://doi.org/10.1080/00036846.2020.1791313.

Huang, Chiung-Ju. 2016. 'Is Corruption Bad for Economic Growth? Evidence from Asia-Pacific Countries'. *The North American Journal of Economics and Finance* 35 (January): 247–56. https://doi.org/10.1016/j.najef.2015.10.013.

Huntington, Samuel. 1968. *Political Order in Changing Societies*. https://elib.manas.edu.kg/book/8008-Political_Order_in_Changing_Societies.pdf.

Jain, Arvind K. 2001. 'Corruption: A Review'. *Journal of Economic Surveys* 15 (1): 71–121. https://doi.org/10.1111/1467-6419.00133.

Kabeya, Patrice Kandolo. 2025. *Development and the Power Theory of Economics: How Power Dynamics Shape Government Policy, Institutions and Economic Strategies*. Springer Nature Switzerland. https://doi.org/10.1007/978-3-032-07926-8.

Kargin-Akkoc, Gamze, and Dilek Durusu-Ciftci. 2024. 'The Interrelationship Between Corruption, Economic Growth, and Trade: Do They Grease or Sand Each Other's Wheels?' *Journal of Quantitative Economics* 22 (4): 977–99. https://doi.org/10.1007/s40953-024-00414-w.

Khan, Mushtaq. 2010. *Political Settlements and the Governance of Growth-Enhancing Institutions*. Working Paper. https://soas-repository.worktribe.com/output/389203.

Kifordu, Henry A. 2010. 'Political Elite and the Vicissitudes of Accountability in Nigeria'. *Politikon* 37 (2–3): 287–309. https://doi.org/10.1080/02589346.2010.522339.

Kim, Jung Wk. 2006. 'The Environmental Impact of Industrialization in East Asia and Strategies toward Sustainable Development'. *Sustainability Science* 1 (1): 107–14. https://doi.org/10.1007/s11625-006-0006-5.

Knights, Mark. 2021. 'What Can We Learn about Corruption from Historical Case Studies?' In *The Oxford Handbook of the Quality of Government*, edited by Andreas Bågenholm, Monika Bauhr, Marcia Grimes, and Bo Rothstein. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198858218.013.8.

Maronna, Ricardo A., R. Douglas Martin, and Víctor J. Yohai. 2006. *Robust Statistics: Theory and Methods*. Wiley Series in Probability and Statistics. J. Wiley.

McMann, Kelly, Daniel Pemstein, Brigitte Seim, Jan Teorell, and Staffan Lindberg. 2022. 'Assessing Data Quality: An Approach and An Application'. *Political Analysis* 30 (3): 426–49. https://doi.org/10.1017/pan.2021.27.

Méon, Pierre-Guillaume, and Laurent Weill. 2010. 'Is Corruption an Efficient Grease?' *World Development* 38 (3): 244–59. https://doi.org/10.1016/j.worlddev.2009.06.004.

Nguyen, Thanh Phuc, Thi Thu Hong Dinh, Ngoc Tho Tran, and Trang Duong Thi Thuy. 2022. 'U-Shaped Impacts of Institutional Quality and ICT Penetration on Economic Growth: Evidence from Selected Emerging Countries'. *Cogent Economics & Finance* 10 (1): 2139887. https://doi.org/10.1080/23322039.2022.2139887.

Nur-tegin, Kanybek, and Keith Jakee. 2020. 'Does Corruption Grease or Sand the Wheels of Development? New Results Based on Disaggregated Data'. *The Quarterly Review of Economics and Finance* 75 (February): 19–30. https://doi.org/10.1016/j.qref.2019.02.001.

Ojo, M. O. 1989. 'The Structural Adjustment Programme and Nigeria's Export Crop Sub-Sector.' *Economic and Financial Review* 27 (4). https://dc.cbn.gov.ng/efr/vol27/iss4/8.

Ojuola, Bola. 2015. 'Femi Akinola, Lagos'. Eko Trust. *Daily Trust*, December 9. https://dailytrust.com/femi-akinola-lagos/.

Okonjo-Iweala, Ngozi. 2012. *Reforming the Unreformable: Lessons from Nigeria*. The MIT Press. https://doi.org/https://doi.org/10.7551/mitpress/9018.001.0001.

Olken, Benjamin A. 2009. 'Corruption Perceptions vs. Corruption Reality'. *Journal of Public Economics* 93 (7): 950–64. https://doi.org/10.1016/j.jpubeco.2009.03.001.

Olken, Benjamin A., and Rohini Pande. 2012. 'Corruption in Developing Countries'. *Annual Review of Economics* 4 (Volume 4, 2012): 479–509. https://doi.org/10.1146/annurev-economics-080511-110917.

Otusanya, Olatunde Julius. 2011. 'Corruption as an Obstacle to Development in Developing Countries: A Review of Literature'. *Journal of Money Laundering Control* 14 (4): 387–422. https://doi.org/10.1108/13685201111173857.

Otusanya, Olatunde Julius, and Sarah Lauwo. 2012. 'The Role of Offshore Financial Centres in Elite Money Laundering Practices: Evidence from Nigeria'. *Journal of Money Laundering Control* 15 (3): 336–61. https://doi.org/10.1108/13685201211238070.

Otusanya, Olatunde Julius, and Sarah G. Lauwo. 2019. 'Corruption and Socio-Political Economic Structures: A Case of Nigeria'. *Journal of Financial Crime* 26 (1): 330–71. https://doi.org/10.1108/JFC-01-2018-0003.

Parsons, Brandon, and Ayoub Rabhi. 2025. ‘Unveiling the Shadows: Corruption, Informal Economies, and Income Inequality in Low-Income Countries’. *Social Science Quarterly* 106 (6). https://doi.org/10.1111/ssqu.70100.

Phillips, Peter C. B., and Pierre Perron. 1988. ‘Testing for a Unit Root in Time Series Regression’. *Biometrika* 75 (2): 335–46. https://doi.org/10.1093/biomet/75.2.335.

Popa, Mircea. 2021. ‘Political Machines and the Institutional Background of Economic Miracles’. *Government and Opposition* 56 (2): 345–64. https://doi.org/10.1017/gov.2019.33.

Rousseeuw, P., and V. Yohai. 1984. ‘Robust Regression by Means of S-Estimators’. In *Robust and Nonlinear Time Series Analysis*, edited by Jürgen Franke, Wolfgang Härdle, and Douglas Martin. Springer US. https://doi.org/10.1007/978-1-4615-7821-5_15.

Saha, Shrabani, and Kunal Sen. 2021. ‘The Corruption–Growth Relationship: Does the Political Regime Matter?’ *Journal of Institutional Economics* 17 (2): 243–66. https://doi.org/10.1017/S1744137420000375.

Song, Yu, Kun-Yao Zheng, and Ghee-Thean Lim. 2026. ‘Factors Affecting and Forecasting of Natural and Synthetic Rubber Production in China’. *Journal of Rubber Research* 29 (1): 145–57. https://doi.org/10.1007/s42464-026-00347-4.

Sotola, David Olusegun, and Pregala Solosh Pillay. 2022. ‘Thick Concept but Thin Theories: A Case for Sector-Based Anti-Corruption Strategy’. *Oxford Development Studies* 50 (4): 372–88. https://doi.org/10.1080/13600818.2022.2080812.

Spyromitros, Eleftherios, and Minas Panagiotidis. 2022. ‘The Impact of Corruption on Economic Growth in Developing Countries and a Comparative Analysis of Corruption Measurement Indicators’. *Cogent Economics & Finance* 10 (1): 2129368. https://doi.org/10.1080/23322039.2022.2129368.

Tassinari, Mattia, Elisa Barbieri, Giovanni Morleo, and Marco Rodolfo Di Tommaso. 2019. ‘Targeted Industrial Policy and Government Failures: Insights from the South Korean Experience’. *International Journal of Emerging Markets* 16 (2): 221–40. https://doi.org/10.1108/IJOEM-02-2018-0110.

Trabelsi, Mohamed Ali. 2024. ‘The Impact of Corruption on Economic Growth: A Nonlinear Evidence’. *Journal of Social and Economic Development* 26 (3): 953–62. https://doi.org/10.1007/s40847-023-00301-9.

Uberti, Luca J. 2022. ‘Corruption and Growth: Historical Evidence, 1790–2010’. *Journal of Comparative Economics* 50 (2): 321–49. https://doi.org/10.1016/j.jce.2021.10.002.

Uddin, Ijaz, and Khalil Ur Rahman. 2023. ‘Impact of Corruption, Unemployment and Inflation on Economic Growth Evidence from Developing Countries’. *Quality & Quantity* 57 (3): 2759–79. https://doi.org/10.1007/s11135-022-01481-y.

Urbina, Dante A., and Gabriel Rodríguez. 2021. ‘The Effects of Corruption on Growth, Human Development and Natural Resources Sector: Empirical Evidence from a Bayesian Panel VAR for Latin American and Nordic Countries’. *Journal of Economic Studies* 49 (2): 346–63. https://doi.org/10.1108/JES-05-2020-0199.

de Vaal, Albert, and Wouter Ebben. 2011. ‘Institutions and the Relation between Corruption and Economic Growth’. *Review of Development Economics* 15 (1): 108–23. https://doi.org/10.1111/j.1467-9361.2010.00596.x.

Wawrosz, Petr. 2022. ‘How Corruption Is and Should Be Investigated by Economic Theory’. *Economies* 10 (12): 326. https://doi.org/10.3390/economies10120326.

Wong, Mathew Y. H. 2025. ‘Economic Development, Corruption, and Income Inequality: The Role of the Informal Sector’. *Politics* 45 (2). https://journals.sagepub.com/doi/10.1177/02633957221148951.

World Bank, Climate Change Knowledge Portal. 2024. ‘Precipitation (Millimeters)’. https://data360.worldbank.org/en/indicator/WB_CCKP_PR.

World Bank Prospects Group. 2025. ‘World Bank Commodities Price Data (The Pink Sheet)’. February 3. https://thedocs.worldbank.org/en/doc/18675f1d1639c7a34d463f59263ba0a2-0050012025/world-bank-commodities-price-data-the-pink-sheet.

World Rainforest Movement. 2009. ‘Nigeria: Michelin’s Rubber Plantations Destroyed Women’s Livelihoods’. https://www.wrm.org.uy/bulletin-articles/nigeria-michelins-rubber-plantations-destroyed-womens-livelihoods.

Yohai, Victor J. 1987. ‘High Breakdown-Point and High Efficiency Robust Estimates for Regression’. *The Annals of Statistics* 15 (2): 642–56. https://doi.org/10.1214/aos/1176350366.