Government Corruption and Foreign Direct Investment under the Threat of Expropriation

Christopher Hajzler*  Jonathan Rosborough†
Bank of Canada  St, Francis Xavier University

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Abstract

Foreign investment is often constrained by two forms of political risk: expropriation and corruption. We model high-level government corruption in dynamic contracts with foreign investors when there is risk of expropriation, investment is not transparent, and public uncertainty over government types (honest or corrupt). The public’s beliefs about government type are updated based on public messages delivered by the government. A corrupt type government is able to extract rents by encouraging hidden investments that are not consistent with the official contract and demanding higher initial payments than an honest type would. This increases expropriation risk above the optimal level associated with the official contract. In this environment, expropriation risk and corruption are inextricably linked – opportunities for corruption are positively associated with exogenous factors that increase the temptation to expropriate, and a higher likelihood of the government being corrupt increases the temptation to expropriate. The model’s results are consistent with several observed facts. Specifically, expropriation is more likely when government take is reportedly low and outgoing governments are accused of corruption. Moreover, higher corruption results in associated with lower overall investment and output. We extend the model to analyze the relationship between political instability and incidence of corruption and expropriation. Higher political instability increases the likelihood of expropriation but the effect of corruption on expropriation is non-monotonic.

Keywords: Expropriation, Foreign Direct Investment, Corruption

JEL Codes: F23; F21; F34

*Corresponding Author: Bank of Canada, Ottawa, Canada. 1 (613) 782-8286 E-mail chajzler@bankofcanada.ca.
†Department of Economics, St. Francis Xavier University, Antigonish, Canada. E-mail jrosboro@stfx.ca.
1 Introduction

One common justification made by governments for expropriating foreign investor assets is that the contracts with the investors being repudiated represent unfair or exploitative deals resulting from prior government rent-seeking behaviour. In particular, low tax/royalty revenues from existing FDI projects, or perhaps the accumulation of public debt, may be the product of rent-seeking behaviour by corrupt officials. The argument, therefore, is that changes to or nullification of contracts are necessary to reverse these unfair terms (or “public betrayals”) forged by a corrupt government previously in office. For example, on December 20th, 2005, Bolivian president Evo Morales announced his intention to nationalize the country’s natural gas industry, claiming that

Many of these contracts signed by various governments are illegal and unconstitutional. It is not possible that our natural resources continue to be looted, exploited illegally, and as the lawyers say, these contracts are legally void and must be adjusted. (Associated Press, December 21, 2005)

In this paper we ask whether there is a link between high-level government corruption, transparency of foreign investment contracts, and the security of property rights. Specifically, when investment commitments of foreign investors are not directly observable, do corrupt governments have an incentive to consistently write contracts with foreign investors that enable both parties to secretly extract rents from the public? Moreover, would the presence of such corrupt contracts result in higher risk of expropriation? If so, this might help explain repeated cycles of nationalization and privatization in many countries with low transparency and poor governmental institutions.

We develop a theory of high level government corruption in contracting with foreign investors and expropriation of foreign investments in which these two common forms of political risk are invariably connected. Specifically, we consider an environment where a host country owns an excludable investment opportunity (such as a natural resource) that requires foreign capital. The foreign investment contract that maximizes expected public welfare features investment that increases only gradually over time in order to minimize the temptation to expropriate. The government or politician that manages the contract is assumed to be either honest or dishonest, and her type is not directly observable by the public. A dishonest politician and the foreign investor have an incentive to violate those terms of the contract that are not directly observable by the public for personal gain. In our model, opportunities for dishonest politicians to engage in corrupt deals with foreign investors depend crucially on the distortions in the optimal contract caused by expropriation risk. If and when the efficient level of investment can be achieved under the optimal contract, absent of any temptation to expropriate on the part of the public, there is no longer any incentive for making corrupt deals. Furthermore, exogenous factors that raise the temptation to expropriate a given project increase both the expected level and duration of corruption. However, there is also a causal link between corruption and expropriation risk that works in the opposite direction. A higher propensity for corruption
in the country, which we model as the likelihood of a politician being a dishonest type, makes expropriation more attractive to the public. The expectation of corruption magnifies the distortions to investment and payments to the host-country under the contract due to expropriation risk, even if no corrupt deals occur *ex ante*. Moreover, when government turnover is included in the model, corrupt deals increase the likelihood an expropriation actually occurs. In fact, the contract the public is able to write with an investor that we consider is fully self-enforcing in the absence of corruption and expropriation *only* occurs if a corrupt deal has taken place. To our knowledge, we are the first to formally examine the endogenous links between expropriation risk and high-level government corruption.

Our theoretical framework builds on Cole and English (1991) and Thomas and Worral (1994), who consider foreign investment when, after investments are made and output is realized, the host country government is unable to commit to not seizing the investor’s assets and consuming the proceeds. In their models and in ours, the investor’s threat of never investing again implies a cost to the host-country that expropriates, and as a result of this potential punishment some positive level of investment can be sustained.\(^1\) When there is a nontrivial threat of expropriation, optimal investment will tend to be below the efficient level, at least for a period of time. We analyse the implications of a lack of transparency regarding the amounts invested in such an environment. When both investment and government type are unobserved by the public, the distortions in optimal investment arising from expropriation risk result in opportunities for corrupt politicians to secretly extract rents for personal gain. The expectation of corrupt violations of the contract, in turn, increases the incentive to expropriate. Expropriation risk and corruption are mutually reinforcing. We examine the implications for investment dynamics, expropriation, and host country welfare.

In modelling expropriation risk, our work is closest to Thomas and Worrall (1994), who characterize the optimal, self-enforcing contract between a government and foreign firm that maximizes discounted firm profits when the government objective function is assumed to be constant. Under this contract, capital investments and state-contingent transfers from the investor to the government are chosen so that expropriation never occurs if the investor upholds its end of the contract. In contrast to their model, we assume that the incumbent government, if it is dishonest, can negotiate deviations from contracted investment with the foreign investor in return for bribes. The public observes whether or not the contracted transfer payments from the investor the host country are made, but relies upon (possibly misleading) reports from the government in every period to condition their beliefs concerning the amount of investment. In addition, we assume that the government type – honest or dishonest – is private information. The honest type always implements the optimal contract, and takes no side payments, while the dishonest type only cares about the stream of side payments it can secretly appropriate. The contracted timing and levels investment and transfers to the host country are fully flexible. However,

\(^1\)This assumption of a maximum punishment strategy is overly strict and not necessary for the main results, though it simplifies the analysis. What is essential in the absence of any direct punishment or enforcement mechanism is that there is a credible threat to not invest for some minimum length of time.
owing to the lack of transparency and possibility of corruption, contracts are not fully self-enforcing and expropriation may occur in equilibrium.

The dynamic features of the optimal contract in this environment are similar to the optimal contract in Thomas and Worrall (1994). In particular, the foreign investor increases investment over time and retains all of the profits from the project until some future date when the maximum investment level that can be supported indefinitely is reached (at which point all of the profits are transferred to the host country.) However, government corruption constrains the optimal contract in several ways. First, for any given project, the anticipation of corruption, by increasing the temptation to expropriate foreign investor assets, decreases investment at each stage of the contract leading up to the stationary contract (and may even lower the long run investment level) and delays payments to the host country. Second, corruption constrains the set of contracts that foreign investors are willing to participate in, and higher corruption results in a more limited set of projects that can be undertaken. In this sense, corruption adversely affects both the intensive and extensive margins of foreign investment. Our model allows us to also evaluate the relationships between political instability, corruption, and the probability expropriation occurs. Higher political instability or government turnover increases the likelihood that the host country will expropriate, but this effect becomes small as corruption falls. Moreover, an expropriation is more likely to occur before the contract has delivered any payments to the host country and when there is evidence of bribes. These two features related to the timing of expropriation provide a rationale for why governments will often justify contract repudiation with the allegation that that existing deals with foreign investors have been exploitative and/or corrupt.

Our work is also related to the literature on investment and government corruption/theft when government types are uncertain. Phelan (2006) considers an environment with a continuum of investors and random, unobserved government types where the opportunistic type has an option to confiscate all investments (and an honest government that never confiscates). His focus is on the evolution of investor beliefs about government type, and the effect on private investment decisions, when an opportunistic type maximizes her own benefit by choosing when to steal investor assets. By contrast, we focus on the case where government type is known to the foreign investor but unknown to the public, and

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2 Thomas and Worrall (1994) are interested in the optimal contract that maximizes investor returns. In this setting, the sequence of investments and transfers along the transition to the stationary contract period are strictly below that of the stationary contract, which corresponds to the contract from date 0 that would maximize host country welfare. We consider the related, dual problem of characterizing the contract that maximizes host country welfare, subject to the investor’s expected discounted payoffs from date 0 being sufficient to cover the investor’s initial setup costs.

3 Phelan (2006) characterizes the Markov perfect equilibrium, where investor strategies are summarized by a probability of/proportion investing anything at all and the opportunistic government choosing the probability it expropriates everything in each period. He demonstrates that the optimal strategy is for the opportunistic government to randomize over the expropriation decision, beginning with a low probability and gradually increasing the likelihood of expropriating after each non-confiscation period as investors’ posterior probability that the government is a virtuous type grows (along with the proportion investing).
opportunism take the form of bribes from investors (i.e. theft of public funds). Expropriation is instead a symptom of the public’s opportunism and a response to government corruption.

Bhattacharyya and Hodler (2010) also model government decisions to appropriate public funds when governments are randomly honest or corrupt, and consider the public’s decision to replace the government when the government type is not directly observable. The authors examine the effect of high resource abundance and low democratic accountability on theft of resource sector revenues as a potential explanation for the “resource curse”. Their model assumes an exogenous link between corruption in resource sector management and efficiency in other sectors of the economy.\(^4\) In contrast, in the environment we consider, the negative effects of the likelihood of a government being corrupt on investment and output arise endogenously whenever investment the contracts being managed by the government is constrained by public’s temptation to expropriate.

The rest of the paper is organized as follows. Section 2 provides a brief overview of patterns of expropriation of foreign direct investment and perspectives on the link between high level government corruption and expropriation. In Section 3, we describe the model environment, and characterize the optimal contract when government type is constant but not observable by the public. The model is then extended in Section 4 to consider the effects of government turnover, where we consider the relationship between political risk, corruption, and the likelihood and timing of expropriation. Section 5 concludes.

## 2 Background on Corruption and Expropriation

Political risk is often cited as an important determinant of FDI in developing countries. This includes risk associated with corruption, war, and expropriation.\(^5\) Expropriation of FDI has become increasingly common in developing countries over the past decade, particularly in natural resource sectors, which appears to be in part explained by relatively high global mineral prices.\(^6\) While the insecurity of property rights that foreign investors face can be attributed to a range of factors, our interest in this paper is the role of corrupt deals between the foreign investor and host country governments. This section provides a brief overview of expropriation patterns documented in the literature, and summarizes the some of the evidence relating high level government corruption to expropriation risk.

\(^4\)They show that if resource productivity is less adversely affected by an increase in theft than productivity in the non-resource sector, a larger resource sector makes theft by corrupt governments more likely if the effect of voter selection on electoral outcomes is below some threshold (i.e. democracy is low). If democratic accountability is sufficiently strong, the corrupt government instead chooses to mimic a virtuous one (resulting in a pooling equilibrium) and waits until the terminal period to steal.

\(^5\)According to a recent survey conducted by the IMF Capital Markets Consultative Group (2003), most managers of companies engaged in FDI rank access to the legal system and the enforceability of contracts first in assessing the political risks associated with investing. (See Albuquerque, 2003; Alfaro et al., 2008; Geiger, 1989; Jensen, 2006; Wei, 2000, for empirical evidence for the adverse impact of political risk on FDI.)

\(^6\)See Hajzler (2012) and Duncan (2005) for empirical evidence on the influence of mineral prices.
Hajzler (2012) examines sectoral expropriation patterns in all developing countries over the 1990-2006 period according to the number of expropriation acts, number of firms affected and estimated value of assets seized. These data reveal that expropriation has been on the rise since the 1980s, and that expropriation risk is particularly acute in resource-based sectors. Figure 1 shows the 3-year rolling average of expropriations, by industrial sector, since 1990. The proportion of assets expropriated in the primaries sector is high (almost 60%) compared to the average developing country production shares (about 22%), with the bulk of these acts occurring in mining and petroleum.

Expropriations often accompany allegations of corruption or illegal dealings on behalf of the foreign investor and/or previous government officials. In a recent expropriation case in Guinea, for example, the government takeover of Brazilian iron mining operations in 2013 accompanied allegations that the rights were illegally issued by the country’s previous dictator in return for bribes. A government committee is reportedly also scrutinizing 18 contracts signed by foreign mining firms and previous regimes. Similarly, governments in Nigeria and the Democratic Republic of Congo have sought to renegotiate tax

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Figure 1: Expropriation Acts by Sector: 1990 - 2006

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7These data update and extend an early data set assembled by Kobrin (1984) for the 1970s and 1980s, where an expropriation “act” is frequency-based measure is defined as the expropriation of any number of firms in a given industry (3-digit SIC category) and in a given year. (See Kobrin, 1984, for a complete discussion of the justification for this measure) A similar sector pattern of expropriation emerges looking at the alternative measures of expropriation intensity in Hajzler (2012). Although expropriations are becoming increasingly more common since the mid-1990s, with a large proportion occurring in Latin America and Central and Eastern Europe, their frequency is low compared to their peak in the 1960s and early 1970s.

8Prior to acquiring these rights, they belonged to a different foreign company, but their claim to the mine was cancelled and rights transferred to the Brazilian subsidiary in 2008. Guinean, Swiss and U.S. authorities have said they began investigations into whether bribes were paid in Guinea to win the rights to develop the mine.
and royalty terms that prevailed under military rulers. In 2013 the Kyrgyz government decided to review a Canadian mining affiliate’s contract, arguing that it would not accept that the 2009 agreement was signed by a democratically elected Government under the former president. This led to the government acquisition of 33 percent stake in the operations, and the government is now demanding 67 percent equity. The government also nationalized a Latvian bank in 2010 having been accused of money laundering on behalf of relatives of the former president. In 2006, the ICSID Tribunal dismissed the expropriation claim of a duty free company against the Kenyan government on the ground that the company had been involved in illegal bribery and corruption.

The large wave of expropriations in Latin America since 2005 also provide several examples of corruption allegations. Bolivian president Evo Morales has repeatedly made claims that the contracts cancelled with foreign investors were either exploitative or corrupt. The Ecuadorian government had initiated civil and criminal proceedings for bribery and fraud against Brazilian firm after its airport construction contract was cancelled in 2008. Allegations of corruption and contractual violations also surround the 2012 Argentinian expropriation of a Spanish company’s petroleum operations in the country.

Rose-Ackerman (1999) provides an in depth perspective on government corruption and and the implications for foreign investment and political risk. Drawing on historical examples of high-level government corruption in doing business with foreign investors, she argues that corruption and bribes often lead to both an inefficient time path for investment and investor concerns over the security of their property rights. She notes that “the concessionaire (or contractor) may fear that those in power are vulnerable to overthrow because of their corruption. A new regime may not honor the old commitments.” She further argues that the risk of contract repudiation associated with government corruption may be less severe when there is low government turnover, observing that the corrupt official “may favor projects with short-term benefits, and these may be the only type of project of interest to multinational investors. The exceptions are countries where an autocratic ruler has been able to make a credible commitment to stay bought, thus giving investors confidence” (Rose-Ackerman, 1999, p. 32-35). However, she also notes that investors may view the willingness of government officials to accept bribes as a negative signal that they will be vulnerable to extortion and changes in contract rules. There is also empirical evidence that government corruption adversely affects foreign investment. Wei

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9For example, following the seizure of a Canadian affiliate’s mining concessions in 2012, the government announced that would be taking legal action against company for “illicit” enrichment during its operations in the country. Meanwhile the company has filed a (USD) $25 million international arbitration claim against the Bolivian government. A Swiss mining affiliate was expropriated in 200. Having purchased the assets owned by the former Bolivian president, the current government claimed the original privatization of the rights were fraudulent transactions and that in re-nationalising the company the government was simply putting things right.

10Moreover, in 2006, major petroleum extraction operations of a U.S. firm had been nationalized in Ecuador for the alleged illegal sale of assets.

11Particularly relevant to this topic is her Chapter 3 analysis of corruption of high-level officials in the procurement of contracts and agreements with foreign investors.
(2000), for example, finds that an increase in corruption (based on a perceptions index) from the level of Singapore to Mexico decreases inward FDI by an equivalent percentage as a 20 percent tax increase.

Corrupt contracts with foreign investors should also be more likely in those industries where governments exercise a high degree of discretion over the allocation rents and control rights, such as natural resources, large public works projects and industries with natural monopolies. Theft may also be easier in resource extraction because contracts are often less transparent to the public and corrupt contracts are more difficult to detect. As O’Higgins (2006) (p.242) notes:

Rent-seeking behavior from such a precious resource is usually sought at the highest level, where decisions are made about who will obtain relevant permits and licenses. A line-up of eager multinationals makes it easy to find and secure corporate partners with the necessary capital and know-how to exploit extractive resources.... Rent-seeking regimes find themselves in possession of large unscrutinized fortunes, which they can then apply to maintaining themselves in power.

Moreover, there is anecdotal evidence that corruption in the form of spending sprees and construction contracts increases when government revenues from resource extraction are also above average (See Ades and Di Tella, 1999). If in addition these corrupt contracts tend to expose the foreign investors involved in the deals to future cancellation of the contract or asset seizure, the high propensity for corruption in natural resources and public utilities may help understand the relatively high expropriation risk in these industries.¹²

The next section develops a formal theory of corrupt contracts under the threat of expropriation.

3 Theoretical Model

3.1. Basic Environment

The basic environment consists of a large number of foreign investors that compete for the exclusive right to operate a single project in a small open economy. The host-country is unable to finance the project itself.¹³ For simplicity, it is assumed that there is no foreign

¹² Other theoretical explanations for the high risk of expropriation in resources include include the prevalence of sunk costs in resources and mineral price volatility (Nellor, 1987; Monaldi, 2001; Engel and Fischer, 2010), varying uncertainty over project returns at different phases (Kobrin, 1980), and strategic political objectives (Shafer, 2009) and the allocation of mineral rights to foreign over domestic investors as a response to political risk (Hajzler, 2014).

¹³ This could be because the host country lacks the required capital or the technological knowledge necessary to carry out the project independent of the foreign investor. Even if technology is the main contribution of the foreign investor, we assume that the host country is sufficiently cash constrained that it is unable to transfer the value of investment upfront as collateral in case the investor’s assets are expropriated.
borrowing, so all capital inflows take the form of FDI.\footnote{Albuquerque (2003) considers both FDI and foreign borrowing in an imperfect contract enforcement environment, where the value of borrowed capital can be fully appropriated whenever default occurs but only a fraction of the value of FDI can be appropriated. In our model, if it is relatively costly for the host country to appropriate FDI due to the specificity of knowledge involved, foreign investment is a superior form of capital inflows in the presence of expropriation risk, and it is makes sense to abstract from other types of inflows.} An investor that is successful in their bid for the project incurs an initial setup cost of $I_0 > 0$, and receives the value of output from time $t = 0$ onwards resulting from capital investment $k_t \geq 0$ made at the beginning of each period, equal to $p f(k_t)$, where we assume

$$f'(k_t) > 0, \quad f''(k_t) < 0, \quad f(0) = 0, \quad \text{and} \quad \lim_{k_t \to 0} f'(k_t) = \infty.$$  

Output is tradable and $p$ represents the exogenous world price. For simplicity, we assume that capital fully depreciates at the end of each period. Finally, we assume there exists a $k^*$ satisfying $p f'(k^*) = 1$. In addition to the capital invested in each period, which is specified under a contract with the host country government, the investor is responsible for making any specified transfers $\tau_t \geq 0$ to the government at the end of each period.

Investment is risky. In any period, once the investor invests and output is produced, the public may not be able to commit to honoring the terms of the contract. Specifically, the public may demand that the government expropriate the entire value of output and forgo the contracted transfers. Following Cole and English (1991) and Thomas and Worrall (1994), we assume that, if the contract is changed in a way that leaves the investor worse off than under the originally agreed terms (including expropriation), the investor punishes the host country by cutting off all future investment.

Taking into consideration its inability to commit to not expropriating, the public chooses the dynamic foreign investment contract that maximizes the discounted expected host country income generated from the project.\footnote{Alternatively, we can view the contract as being chosen by an initial period elected government according to the public’s preferences.} Although the full terms of this contract are common knowledge to the investors, government officials, and public, we assume that capital investments and output from the project are unobserved by the public. Instead, the government in each period sends a message $m_t \in M \subset \mathbb{R}^+$ to the public (which may or may not be credible) concerning the level of investment. However, the public observes when the transfer payments under the contract are received (or not received) into the public funds.

The government manages the foreign investment contract, monitoring investments and collecting transfers, and can be one of two types – honest or corrupt – where types differ according to their objective function. While the investor knows the government’s type at each date $t$, we assume that the public does not. The honest type always implements the contract that is optimal from the perspective of the general public, does not appropriate any of the transfers under the contract, and always truthfully reports the level of investment each period. The corrupt type, by contrast, only cares about the stream
of side payments it can secretly appropriate by deviating from the optimal contract, and
does not necessarily provide truthful reports. We assume that an incumbent government
may be replaced randomly in any given period by a new government of either type. For
simplicity we assume that, in any given period, the probability of a government being
replaced depends only on the public’s beliefs concerning whether it is a corrupt type or
not. If the incumbent government is replaced by the opposition, the incumbent disapp-
pears, and a new opposition party replaces the now ruling government, having the same
exogenous probability of being corrupt as the one before it. Note that because the honest
government type only implements the contract chosen by the public and reports the truth,
the strategic agents consist of the foreign investor, the public/electorate, and the corrupt
government official.

In this environment, government corruption takes the form of receiving side-payments
$b_t > 0$ from the investor which arise from deviations in investment from the level spec-
ified under the optimal contract. We assume that corrupt governments do not have the
same incentive as the public to expropriate foreign investment because they are unable to
appropriate any part of an expropriated project. Because investment is not observed by
the public, violations of the optimal contract yield potential rents to the parties engaged
in the corrupt deals. We will show that such rents are large when the public’s temptation
to expropriate is high.

The timing of the model is as follows: Once an initial contract is offered by the gov-
ernment to an investor, the investor obtains an exclusive right to the project and agrees to
make a sequence of capital investments, as well as public transfers to the host-country,

| $t - 1$ | Investor decides whether to invest |
| | ↓ |
| $t$ | If corrupt, government may accept investment $k_t^d$ with private payment $b_t$; Otherwise $k_t^c$ is invested |
| | ↓ |
| | Government election occurs |
| | ↓ |
| | Government sends public message $m_t \in M$ |
| | ↓ |
| | Public decides whether or not to expropriate given $m_t$ |
| | ↓ |
| | Investors pay $\tau_t$ to the public if not expropriated; Otherwise contract is terminated from $t + 1$ onward |

Figure 2: Model Timing
conditional on not being expropriated. At the beginning of each period, the incumbent
government may be of either type. A corrupt government may agree to a level of invest-
ment \( k_d \) that exceeds the contract level \( k_c \). If \( k_t = k_d \), a side payment \( b_t \) is paid by the
firm to the government. If instead the government is an honest type or if \( k_d \) is rejected by
the corrupt type, \( k_t = k_c \). Before the production process is complete, an election takes
place and the incumbent government potentially replaced by a new government (its type
also unknown to the public). The government (incumbent or new) observes investment
and sends a message to the public: \( m_t \in M \subset \mathbb{R}^+ \). Output is produced, and the public
demands that the government either expropriate the full value of output or to instead
collect the contracted transfers \( \tau_t \) from the investor and continue to the next period of the
contract. This timing within each period is summarized in Figure 2.

### 3.2. Public Returns

A contract is a sequence of investment levels and transfers from the investor in the form
of public revenues (conditional on not being expropriated), \( \theta = \{k_t, \tau_t\}_{t=0}^{\infty} \), given that
the firm has incurred the initial setup cost \( I_0 \). We denote discounted expected payoff
to the host country public from remaining in a contract with the foreign investor from
period \( t \) onwards by \( V^c_t \), and the corresponding contracted discounted profits to the in-
vestor as \( W^c_t \). If expropriation occurs in any period \( t \), the investor cuts off all future
investments, and there is no public gain to seizing only part of the value of assets in that
period. Therefore when expropriation occurs the entire value of output is seized, and
the host-country payoff from expropriating all output expected by the public, who do not
observe investment directly but form expectations based on the messages they receive, is
\( V^e_t(m_t) = E[pf(k_t)|m_t] \). (This value may or may not equal to actual value of expro-
priation, which is known to the government, depending on whether the message \( m_t \) is
credible.)

We assume that investors, host country governments and the public are risk neutral
and discount future returns at the same rate \( \beta \in (0, 1) \). Suppose for the moment that, un-
der the optimal contract, expropriation occurs whenever deemed beneficial by the public,
regardless of the government’s type. (We will show that this assumption is consistent with
equilibrium strategies of the agents.) The recursive formulation of the public’s \textit{ex post} ex-
pected payoff under the contract, after having received message \( m_t \) from the government,
is
\[
V_t(m_t) = \max \{ \tau_t + \beta E_t[V_{t+1}(m_{t+1})|m_t], V^e_t(m_t) \}
\]
where expropriation does not occur provided
\[
\tau_t + \beta E_t[V_{t+1}(m_{t+1})|m_t] \geq V^e_t(m_t).
\]

We are interested in the optimal contract between the firm and host country that max-
imizes expected public utility from the beginning of each period \( t \), \( V^c_t = E_t[V_t(m_t)] \),
conditional on not having expropriated and terminated the contract in the past. Although an honest type government implements the contract, the optimal contract must take into account the potential contract violations that may be carried out by a corrupt type.

We can express $V^c$ more compactly by defining the set of government reports $D^t(\theta) \subset M$ (possibly empty) in a given period $t$ for which the public believes with certainty that Condition (2) is violated:

$$D^t(\theta) = \{m_t \in M \mid \tau_t + \beta E_t[V_{t+1}(m_{t+1})|m_t] < V^e_t(m_t)\}.$$ 

We use $\rho_t(\theta)$ to denote the public’s belief at the beginning of period $t$ about the likelihood that they will receive a report $m_t \in D^t(\theta)$. Thus, the ex ante expected payoff in period $t$ to the public from the contract $\theta$ given that expropriation has not occurred in any previous period can be defined recursively as

$$V^e_t = \sup_{\theta} \left(1 - \rho_t\right) \left(\tau_t + \beta V^e_{t+1}\right) + \rho_t E_t[V^e_t(m_t)|m_t \in D^t]$$ (3)

where the notation signifying the dependence of $\rho_t$ and $D^t$ on $\theta$ has been suppressed for brevity. We are interested in the characteristics of an official (or “honest”) contract that maximizes (3) that is feasible and satisfies the participation constraint of the investor, subject to the probability of expropriation given $\rho_t$. The official contract is feasible if

$$\tau_t \geq 0$$ (4)

and

$$pf(k^c_t) - \tau_t \geq 0$$ (5)

for all $t$. The firm is willing to participate in the official contract provided it offers expected discounted profits at least equal to the initial setup cost $I_0$.

According to the following Lemma, under such a contract there would be no expropriation whenever the public receives a report that the contracted amount is invested. This implies that, if $\theta$ is an optimal contract, $k^c_t \notin D^t(\theta)$ for any $t$.

**Lemma 3.1.** Under the optimal contract $\{k^c_t, \tau_t\}_{t=0}^\infty$, in any $t$ such that $m_t = k^c_t$, Condition (2) is satisfied.

**Proof.** Consider the case where $k_t = k^c_t$. By definition, an honest type always ensures the contracted amount of investment and reports investment truthfully. Suppose that, having received the report $m_t = k^c_t$, expropriation were optimal under the contract. Then for some report $m_t \neq k^c_t$, expropriation is not optimal, otherwise the investor would not be willing to invest in period $t$. Since $k^c_t$ is invested, such a report must originate from a corrupt type, implying that the investor would only ever be willing to invest $k_t = k^c_t$ under a corrupt regime. But then $k^c_t$ would not be optimal under the contract. $\Box$

The next section outlines the expected returns of the foreign investor engaged in an official contract with the public when the investor may also engage in corrupt contracts
that are not directly observable. Consistency conditions for the recursive formulation of
the contract (or “promise keeping” constraints) are then established in Sections 3.4. and 4
which characterize the optimal contract when the government type is constant and when
there is stochastic type renewal, respectively.

3.3. Investor Returns and Corrupt Contracts

In characterizing the optimal contract, it is useful to begin by considering the optimal
responses of the firm under a corrupt regime to a given contract $\theta$. Discounted investor
profits can be expressed recursively as

$$W_t = \sup_{\{k_t, b_t\}_{t=0}^{\infty}} (-k_t - b_t + (1 - \rho_t) (pf(k_t) - \tau_t + \beta W_{t+1}).$$

If the government is an honest type in period $t$, the investor and government are commit-
ted to the transfers and investment levels set out in the contract. If the government is a
corrupt type, however, it may be profitable for the investor and government to violate the
contract terms by investing $k^d_t > k^c_t$ if $k^c_t$ is below the unconstrained efficient level $k^*$. We define total rents from investing $k^d_t$ given $k^c_t$ as the difference in expected profits that
can be shared between the investor and corrupt government by from not honoring $k^c_t$ (but
still making the contracted transfers to the public):

$$R(k_t | k^c_t) = (1 - \rho_t) pf(k_t) - pf(k^c_t) - (k_t - k^c_t) - \rho_t \beta W_{t+1}. \quad (6)$$

The following Lemma establishes that, whenever under a corrupt regime the investor’s
optimal response to a contract is to invest the contracted amount, there is no expropriation
risk and $R(k_t | k^c_t) = 0$. This implies that any violation of the contract terms must offer
strictly positive rents.

**Lemma 3.2.** $R(k_t | k^c_t) = b_t = \rho_t = 0$ whenever $k_t = k^c_t$ is an optimal response to a
contract $\theta$.

**Proof.** If, given the official contract, the optimal response under a corrupt regime is
to invest the contracted amount $k^c_t$, the public would always expect $k_t = k^c_t$. From
Lemma 3.1, expropriation therefore cannot occur in period $t$, implying $\rho_t = 0$. Therefore
$R(k^c_t | k^c_t) = 0$ and $b_t = 0$. □

Next consider a potential profitable violation of the official contract such that $\rho_t$ is
independent of $k_t$ for any level strictly above $k^c_t$. (In the Sections 3.4. and 4 that follow,
this is the relevant case to consider.) Clearly, if $k^c_t \geq k^*$, $R(k_t | k^c_t) < 0$ whenever $k_t > k^c_t$,
and there is no incentive to violate the contract. Consider $k^c_t < k^*$.

Then if not honoring the contract is profitable, optimal investment $k^d_t$ solves

$$(1 - \rho_t) pf'(\tilde{k}_t) = 1. \quad (7)$$
If \( R(\tilde{k}_t|k^c_t) > 0 \) then \( k^d_t = \tilde{k}_t > k^c_t \); otherwise \( k^d_t = k^c_t \). This results in a sequence \( \{k^d_t\}_{t=0}^{\infty} \), given the contract and \( \{\rho_t\}_{t=0}^{\infty} \), that represents realized investment in each period that an expropriation has not previously occurred. The side payments \( \{b_t\}_{t=0}^{\infty} \) reflect the division of these rents between the corrupt government and the investor as a result of bargaining. In the ensuing analysis, any division of rents (if they are positive), including the Nash bargaining solution, is allowed provided \( b_t > 0 \).

The optimal contract maximizes public utility, taking as given this optimal response of the investor under corrupt regimes. We first consider the optimal contract in the simplest possible environment with no political turnover and constant government types. In this environment, government reports about the level of investment are not informative and, if a non-trivial contract exists, it is self-enforcing. We then extend the analysis to include political turnover with stochastic type renewal, and show that expropriation can occur in equilibrium as a result of corrupt contract violations.

### 3.4. Optimal Contract With Constant Government Type

We consider the optimal contract in an environment with no political turnover, where the type of government is constant throughout the contract but initially unknown to the public. We restrict our attention to the interesting case where the unconstrained efficient level of investment in all periods is unattainable owing to the public’s temptation to expropriate. We proceed by characterizing the optimal contract under the assumption that the government, regardless of its type and the actual investment level, always reports \( m_t = k^c_t \), rendering the messages uninformative, and then demonstrate that, in fact, \( m_t = k^c_t \) for all \( t \). This, along with Lemma 3.1, implies that expropriation never occurs in equilibrium. We find that the dynamics of the optimal contract are qualitatively similar to the optimal contract studied by Thomas and Worrall (1994). However, we also find that the mere possibility of corrupt contracts results in lower contracted investments, particularly at the early stages of the contract, and a lower discounted stream of transfers to the public.

Suppose that the government is a corrupt type with probability \( \delta \) and on honest type with probability \( 1 - \delta \). Assuming that \( m_t = k^c_t \) for any level of actual investment, then

\[
\bar{V}_t^e = V_t^e(k^c_t) = \delta p f(k^d_t) + (1 - \delta) p f(k^c_t)
\]

where \( k^d_t \) is defined in Section 3.3, and is fully anticipated by the public, given \( k^c_t \). The following lemma establishes the amount of capital that is invested when the government type is corrupt, \( k^d_t \), as well as the implied constraints on the optimal contract taking \( k^d_t \) as given.

**Lemma 3.3.** If government types are constant, \( \rho_t = 0 \) for all \( t \) and a corrupt government chooses \( k_t = k^d_t = k^* \) given any \( k^c_t \). Moreover, the optimal contract satisfies

\[
\tau_t + \beta V_{t+1}^c \geq \delta p f(k^*) + (1 - \delta) p f(k^c_t)
\]
for all \( t \), taking \( k^d_t = k^* \) as given.

**Proof.** Consider a period under the contract where \( k^c_t < k^* \) and suppose that \( k^d_t = \tilde{k}_t > k^c_t \), where \( \tilde{k}_t \) is implicitly defined by (7) given \( \rho_t \). Since both government types report \( m_t = k^c_t \), Condition (2) is satisfied, implying \( \rho_t = 0 \) and hence \( k^d_t = k^* \). Then \( k^c_t \) is constrained to satisfy (8), where the left hand equals \( \bar{V}^c_t \) and \( V^c_{t+1} \) is simply the continuation value of the contract given \( m_t = k^c_t \notin D^t \) (see Lemma 3.1).

With \( \rho_t = 0 \) and \( k^d_t = k^* \) taken as given by the public, Lemma 3.3 implies that the optimal contract solves

\[
V^c_t = \sup_\theta \tau_t + \beta V^c_{t+1}
\]

subject to Condition (8) as well as feasibility conditions, the investor’s participation constraint and a promise keeping constraint. The latter enables us to solve the dynamic problem using the recursive definitions given above while treating the continuation profits of the investor under the contract, \( W^c_{t+1} \), as a state variable, where

\[
W^c_t = \sum_{s=t}^{\infty} \beta^{s-t} (p f(k^c_s) - k^c_s - \tau_s) = p f(k^c_t) - k^c_t - \tau_t + \beta W^c_{t+1}.
\]

That is, in addition to specifying investment and transfers, the contract can be considered a promise in time \( t \) of discounted future profits, \( W^c_{t+1} \), such that

\[
p f(k^c_t) - k^c_t - \tau_t + \beta W^c_{t+1} \geq W^c_t. \quad (9)
\]

Finally, an investor is willing to participate in the contract under an honest government regime from any period \( t \) onward provided

\[
W^c_{t+1} \geq 0 \quad (10)
\]

and given initial condition

\[
W^c_0 \geq I_0. \quad (11)
\]

Features of this dynamic programing problem are very similar to the problem considered in Thomas and Worrall (1994). In particular, owing to the dependence of the constraint set on the optimum value function itself, and because the concavity of \( f(\cdot) \) on the right hand side of (8) implies the constraint set is not convex, standard contraction mapping arguments cannot be used to establish a unique fixed point for the value function \( V^c_t = V^c(W_t) \). However, the authors describe an iterative mapping procedure starting from the first-best, Pareto frontier that converges to the optimum value function. Lemma 3.4 applies their result in the present context.

**Lemma 3.4.** There exists a sequence \( \{L^n P^*\}_{n=0}^{\infty} \) defined by operator \( L : \mathcal{P} \rightarrow \mathcal{P} \), where \( \mathcal{P} \) is the space of continuous, bounded and concave functions on \([0, \bar{W}]\) and \( \bar{W} = (p f(k^*) - k^*)/(1 - \beta) \), that converges pointwise to the optimum value function \( V^c(W) \).
Proof. See the Mathematical Appendix.

Using multipliers $\mu_t$, $\varphi_t$, $\phi_t$, $\lambda_t$, and $\beta\zeta_t$ on constraints (4), (5) and (8)-(10), the first order conditions corresponding to the dynamic programming problem are

$$
\tau_t : \quad 1 - \varphi_t + \mu_t + \phi_t - \lambda_t = 0 \quad (12)
$$

$$
k_c^e_t : \quad (\varphi_t + \lambda_t - \phi_t(1 - \delta))pf'(k_c^e_t) - \lambda_t = 0. \quad (13)
$$

Moreover, fully differentiating with respect to $V_c^e(t+1)$ and $W_c^e(t+1)$, we can summarize the Pareto frontier $V_c^e(W_c^e)$:

$$
\frac{\partial V_{t+1}^e}{\partial W_{t+1}^e} = -\frac{\lambda_t + \zeta_t}{1 + \phi_t}. \quad (14)
$$

Finally, we have the envelope condition

$$
\frac{\partial V_t^e}{\partial W_t^e} = -\lambda_t. \quad (15)
$$

Taken together, equations (14) and (15) summarize the dynamics of the contract as well as expected future payoffs for both the public and the investor. Before turning to the dynamics of the optimal contract, the following Lemmas establish that the conditions above describe a global optimum, and lay out some other features of the optimal contract that help simplify the analysis.

Lemma 3.5. $V_c^e(W_c^e)$ is concave, with strict concavity when $V_c^e(W_c^e)$ does not correspond with the first best Pareto frontier. Moreover, $\partial V_t^e/\partial W_t^e \leq -1$, and (5) never binds.

Proof. See the Mathematical Appendix.

Lemma 3.6. For any period $t$ in which $k_c^e_t < k^*$, the optimal contract satisfies (8) with strict equality: $\tau_t + \beta V_{t+1}^e = \bar{V}_t^e$.

Proof. Suppose toward a contradiction that for some period $t$ we have both $k_c^e_t < k^*$ and $\tau_t + \beta V_{t+1}^e > \bar{V}_t^e$. The latter implies that $\phi_t = 0$ from complementary slackness, and since $\varphi_t = 0$ and $\lambda_t > 0$ from Lemma 3.5, (13) becomes $pf'(k_c^e_t) = 1$ which would imply $k_c^e_t = k^*$.

The next proposition establishes that the dynamics of the optimal contract are qualitatively similar to Thomas and Worrall (1994). This features a back loading of transfers from the investor to the host country, and a gradual increase in contracted investment levels over time (which may or may not reach the unconstrained efficient level):

Proposition 3.7. Under the optimal contract, $k_c^e_t$ is increasing over time and $\tau_t = 0$ until $k_c^e_t$ reaches stationary value $\hat{k} \leq k^*$, after which transfers to the host country are positive.
Proof. See the Mathematical Appendix.

Assuming a contract characterized by the unconstrained efficient level of investment in all periods cannot be achieved, the optimal contract is structured to deliver the investor’s minimum expected payoff from the project, $W_0 = I_0$, as quickly as possible without violating the expropriation constraint. This involves postponing transfers to the host country until $I_0$ is recovered through investor profits. If instead the contract featured a positive transfer on some earlier date, lowering this transfer today (keeping the contracted investment stream constant) could be offset with an equal (discounted) increase in future transfers. This would satisfy today’s expropriation constraint, allowing current period investment to remain the same. It would also satisfy promise keeping, since a reduction in the investor’s taxes today is offset by an equal (discounted) increase in future taxes (since investors discount at the same rate). Note that this otherwise neutral change in the timing of transfers relaxes the host country expropriation constraint in every period up to the time that the offsetting transfer increases are received. But then higher investment is possible in every one of these future period such that the expropriation constraint binds. Increasing investment in each of these periods also implies higher discounted transfers and host country welfare (given the promise it has kept to the investor), and therefore higher investment today. Contracted investment, in turn, is set at the maximum level permissible in each period without inducing expropriation, given the scheduled transfers from the investor to the host country. Because these transfers do not appear until some date $t^* - 1$, the discounted payoff to the public arising from the contract at every date $t < t^*$, $V_t^c$, increases at the rate $\beta^{-1}$. Since the expected value of output (given public beliefs) under the contract must not exceed the discounted expected value...
of transfers under the contract, this also bounds the rate at which contracted investment can increase.

Figure 3 illustrates the Pareto frontier when (i) the efficient level of investment along the first best frontier is eventually reached ($\hat{k} = k^*$), and (ii) the efficient level of investment cannot be supported as a stationary contract ($\hat{k} < k^*$). The relative position of the Pareto Frontier, in turn, depends on, in addition to the production technology, values of $\beta$ and $\delta$. (These relationships are described below.) Because the optimal contract (if one exists) must offer a discounted payoff over the life of the contract at least equal to the investor’s sunk investment, the position along the frontier where $W_0 = I_0$ determines the discounted payoff to the host country, which reflects the levels of investment along the transition to the stationary contract as well as the duration of this transition. When $I_0$ is large, a longer period of zero transfers is required for the investor to recoup the initial investment. All else equal, prolonging transfers lowers the discounted payoff to the host country, making it more tempting to expropriate for a given level of investment. As a result, investment levels along the transition to the stationary contract are also lower, which further reduces the discounted payoff received by the host country.

Whether or not a non-trivial optimal contract exists offering the investor $I_0$ and positive expected return to the host country depends on parameters $I_0$, $\beta$, and $\delta$. Proposition 3.7 demonstrates that a non-trivial optimal contract, if it exists, must converge to a stationary contract period with constant $k^*_c = \hat{k} \leq k^*$. Therefore the existence of a stationary contract period supporting $\hat{k} > 0$ is a necessary, though not sufficient, condition for the existence of an optimal contract. Proposition 3.8 establishes necessary and sufficient conditions for a stationary contract period, which depends on parameters $\beta$, and $\delta$. Having established the conditions for the existence of a stationary contract, we able to identify necessary and sufficient conditions for an optimal contract with the features of Proposition 3.7, conditional on the existence of a stationary contract.

**Proposition 3.8.** Given $\delta \geq 0$ and $I_0 > 0$, there exists a continuous relationship $\beta(\delta)$ such that for any $\beta \geq \overline{\beta}(\delta)$ a stationary contract exists but not otherwise. Moreover, $\overline{\beta}(\delta)$ is strictly increasing in $\delta$, is bounded below at $\overline{\beta}(0) = 0$ and bounded above at $\overline{\beta}(1) = \overline{\beta}$, where $\overline{\beta} \in (0, 1)$ is the threshold level of $\beta$ such that $\hat{k} = k^*$ if and only if $\beta \geq \overline{\beta}$.

**Proof.** See the Mathematical Appendix.

According to Proposition 3.8, a non-trivial optimal contract, if it exists, eventually attains the efficient level of investment for any probability that the government is a corrupt type if the rate of discounting is sufficiently low. Additionally, if the probability that the government is a corrupt type is zero, our assumptions on $f(\cdot)$ imply that a stationary contract exists for any discount factor. For higher levels of impatience and higher corruption levels, there is a monotonic trade-off between patience and the corruption level that describes the set of possible contracts: as corruption becomes more likely, a higher level of patience is required in order to support any stationary contract. Intuitively, as the rate of discount rises above some threshold, there is an increasing wedge between the level
Figure 4: Existence of a Stationary Contract

of contracted investment that can be supported in the stationary period of the contract and the efficient level, where the contracted stationary investment level is bounded by the expropriation constraint. Then as the level of corruption rises, the public believes it is more likely that actual investment (under a corrupt type) is the efficient level, and this necessitates an even lower contracted investment level in order to satisfy the expropriation constraint. However, not all levels of investment can be supported in the stationary period of the contract. Even when the host country receives all profits from the contract, when impatience is high and the likelihood of a corrupt contract resulting in the efficient investment is also high, there is no contracted level of investment low enough to mitigate the temptation to expropriate.

The tradeoff between the likelihood of a corrupt type and the discount factor, $\beta(\delta)$, is illustrated in Figure 4. Above $\beta(\delta)$, a stationary contract can be supported in equilibrium, but not otherwise. For $\beta \geq \bar{\beta}$, a stationary contract always exists, independent of the level of corruption. As agents become more impatient, however, a stationary contract exists if and only if the likelihood of corruption is sufficiently low.

Given the existence of a stationary contract, there exists a non-trivial optimal contract that offers both the host country and the investor some positive return from date 0. However, since the investor requires at least promised payoff $I_0$ in order to participate in the contract, the set of optimal contracts given $I_0$ is only a subset of possible stationary contracts. We now examine how this subset of possible contracts is related to parameters $\beta$ and $\delta$ through $I_0$.

**Proposition 3.9.** If a non-trivial stationary contract exists given $\beta$ and $\delta$, then there is a corresponding threshold $\bar{I}(\beta, \delta)$ increasing in $\beta$ and decreasing in $\delta$ such that a
non-trivial optimal contract exists from date 0 if and only if $I_0 \leq \bar{I}(\beta, \delta)$. Moreover, if $I_0 \leq \bar{I}(\beta, \delta)$ then for any date $t$ in which $k_t^c < k^*$, $k_t^c$ is strictly decreasing in $\delta$.

Proof. See the Mathematical Appendix.

Proposition 3.9 implies that anticipated corruption lowers overall investment and host country welfare under the optimal contract in two ways. First, for any optimal contract that supported under $\delta$, $\beta$, and $I_0$, contracted investment in every period along the transition to the stationary period of the contract is strictly lower as $\delta$ is higher, and unless the efficient frontier is reached, investment also remains low in the stationary period. Second, the set of initial set up costs $I_0$ for which an optimal contract exists is smaller for larger values of $\delta$. That is, for sufficiently high $\delta$, only projects featuring arbitrarily low initial costs $I_0$ will be undertaken by foreign investors. Extending this intuition to an environment with a large number of simultaneous projects characterized by different set up costs, this implies an extensive margin for foreign investment that decreases as the possibility of corruption increases.

Figure 5 illustrates the impact of corruption on the Pareto frontier and the set of permissible contracts given $I_0$. As the probability of a corrupt type $\delta$ increases, the frontier shifts downward, but without influencing the stationary contract, in the case that it can be reached, and is therefore pivoted at $\hat{k}$. Given $I_0$, this implies that an optimal contract, if it exists, will offer the host country lower initial utility $V_0$, which reflects both lower investment levels along the transition to the stationary contract and a prolonged transition with zero transfers. The figure also shows that, if $\delta$ is sufficiently high, then an optimal contract may not exist given $I_0$, even though a contract would have existed at lower levels.
of corruption.

It is worthwhile to note that, although realized foreign investment for a given project under a corrupt government is unchanged as the likelihood of corruption increases, our results imply that expected investment is smaller under a given contract as the expectation of corruption increases. Nevertheless, public returns from the project depend only on reported investments (given that expropriation never occurs). Therefore, in addition to potential reductions in host country welfare owing to lower investment on the extensive margin, host country welfare is reduced by lower investment on this intensive margin of any particular contract.

We close the analysis of this section by arguing that, if the government is a corrupt type, there is no incentive to report anything other than $m_t = k^c_t$. If the honest type always implements $k_t = k^c_t$ and reports truthfully, then any report $m_t \neq k^c_t$ reveals to the public that the government is a corrupt type. The public, knowing that $k_t = k^*$, would therefore require that the contract satisfy

$$\tau_t + \beta V^c_{t+1} \geq pf(k^*_t)$$

for all $t$ following such a report in order to not expropriate. Otherwise the firm would not invest. However, along the transition to the stationary contract period before the efficient frontier can be reached, this condition cannot be satisfied. (Otherwise it would be always be possible to attain the efficient level of investment and the expropriation constraint never binds.) On the other hand, once the efficient frontier is reached (if at all), there is no longer any incentive for the investor to write a corrupt contract, $k^c_t = k^d_t = k^*$ is known by the public and the above condition is already satisfied under the optimal contract. Therefore $m_t = k^c_t$ in equilibrium, regardless of government type.

### 4 Optimal Contract With Political Turnover

We now consider the optimal contract in the presence of government turnover. Specifically, we assume that in any period an incumbent government can be replaced by a new government in one of two ways. First, the public can decide to replace a government based on beliefs about the government type, taking into account the implications of type on the expected public returns from the contract, as in Bhattacharyya and Hodler (2010). Second, the incumbent may be replaced randomly in any period independently of public beliefs and the optimal contract. This captures the idea that governments are sometimes replaced by the electorate based on factors outside of the model. As in Phelan (2006), this results in stochastic government type renewal, and public beliefs about the government type evolve according to the actions taken by the government.

In this environment, equilibrium outcomes depend on the ability of the government to send messages to the public. Specifically, although a corrupt type will have no incentive to report anything other than $m_t = k^c_t$, as in the case without government turnover considered in Section 3.4., the public will receive report $m_t = k^d_t$ whenever a corrupt
type is replaced by an honest type. When \( k_t^d \neq k_t^c \) and a corrupt type always reports \( m_t = k_t^c \) in equilibrium, the fact that an honest type always reports truthfully and a corrupt type always reports \( m_t = k_t^c \) implies that the message \( m_t = k_t^d \) is credible. Knowing that \( k_t = k_t^d \) when \( m_t = k_t^c \) the public will, under certain conditions, find it optimal to expropriate in equilibrium.

Denote the probability that a government is randomly replaced in any given period by \( \sigma \). (With probability \( 1 - \sigma \), the incumbent government remains in power.) Assume for the moment that a corrupt incumbent government always reports \( m_t = k_t^c \), so that it never reveals its type. Then conditional on the incumbent being a corrupt type, the probability that the public will receive a report \( m_t = k_t^d \) is the probability that it is replaced by an honest type, \( \sigma(1 - \delta) \). In the analysis that follows, we are interested in the probability the public places on receiving a report \( m_t = k_t^d \) in any period for the first time over the course of the contract. Since the posterior belief that the government is a corrupt type having only received message \( m_t = k_t^c \) up to the current period \( t \) is \( \delta \), the public believes that report \( m_t = k_t^d \) will be received for the first time with probability \( \sigma \delta(1 - \delta) \). The following propositions establish that this also equals the probability that expropriation occurs in equilibrium:

**Proposition 4.1.** When there is stochastic political turnover, the probability of that expropriation occurs in any period \( t \) such that \( k_t^d \neq k_t^c \) is \( \bar{\rho} = \sigma \delta(1 - \delta) \).

**Proof.** See the Mathematical Appendix.

In other words, whenever a corrupt contract \( k_t^d \neq k_t^c \) is profitable, \( k_t^d \) solves \( pf'(k_t) = (1 - \bar{\rho})^{-1} \), and expropriation occurs with probability \( \bar{\rho} = \sigma \delta(1 - \delta) \). The contracted level of investment \( k_t^c \), in turn, must satisfy

\[
\tau_t + \beta E_t[V_{t+1}^c] \geq E_t[V_t^c(k_t^c)] = \delta pf(k_t^d) + (1 - \delta)pf(k_t^c).
\]

(16)

The corresponding dynamic programming problem maximizes (3) subject to (4), (5), (9)-(10) and (16), taking the probability of expropriation \( \bar{\rho} = \sigma \delta(1 - \delta) \) and the corresponding level of investment under the corrupt contract, \( k_t^d < k^* \), as given.

The main features of optimal contract are very similar to the contract without government turnover in Section 3.4. However, expropriation may occur in equilibrium, and the likelihood of expropriation is determined by the level of political instability and the prevalence corruption. Features of the optimal contract are summarized in the following proposition:

**Proposition 4.2.** Under the optimal contract, \( k_t^c \) is increasing over time, \( \tau_t = 0 \) and and the probability of expropriation is \( \bar{\rho} \) until \( k_t^c \) reaches stationary value \( \hat{k} \leq k^* \), after which transfers to the host country are positive, and expropriation occurs with positive probability if and only if \( \hat{k} < k^* \).

**Proof.** See the Mathematical Appendix.
The intuition for the dynamics of the optimal contract is the same as in Section 3.4. The only substantive difference is a positive probability of expropriation under the optimal contract. By assumption, the first best frontier is unattainable in the very first period and $k^c_t < k^*$ over some initial phase of the contract. Because corrupt contracts can neither be prevented nor insured against, political turnover and the possibility of an honest government replacing a corrupt one implies that with positive probability, $k_t = k^*$ is revealed to the public with certainty. When $k^c_t < k^*$, this must violate the expropriation constraint.

Finally, it is worthwhile to consider the relationship between expropriation risk, corruption, and political instability. Given the likelihood of the government being corrupt $\delta \in (0, 1)$, the probability of an expropriation is strictly increasing in the rate of stochastic government turnover $\sigma$. Therefore political instability increases the likelihood of expropriation, but only if there is corruption $\delta > 0$. Given $\sigma$, however, the effect of corruption on the likelihood of expropriation is non-monotonic (reaching a maximum likelihood at $\delta = 0.5$). As $\delta$ rises above or below this threshold, it is less likely that government turnover will result in a change in government type, which is a necessary condition for the public to receive a report that would induce expropriation.

To close the characterization of the equilibrium contract, we only need to verify that $m_t \neq k^c_t$ only if an honest type succeeds a corrupt type (at a point in the contract that does not correspond to the first best Pareto frontier) is consistent with the equilibrium strategies and beliefs. As in the case of no government turnover considered in Section 3.4., a corrupt type has no incentive to report $m_t \neq k^c_t$ as an incumbent, which would reveal that it is not an honest type. (Otherwise $k^c_t$ would have been both invested and reported.) The reason is that under a corrupt government, actual investment is $k^d_t = k^*$, and type revelation would result in a violation of the expropriation constraint whenever $k^c_t < k^*$ and the termination of the contract with the foreign investor for all future dates. But since this outcome does not increase the corrupt government’s expected future pay-off (and strictly decreases its pay-off when future contracted investments are below the unconstrained efficient level), a corrupt incumbent would never choose report $m_t \neq k^c_t$. Given that an honest incumbent also always reports $m_t = k^c_t$ (as the incumbent it ensures this is what is invested), only a succeeding government reports anything other than $k^c_t$. A newly elected honest government reports $m_t = k^d_t \neq k^c_t$ only if it replaces a corrupt type and $k^c_t < k^*$, and reports $m_t = k^c_t$ otherwise. If $k^c_t < k^*$ and a newly elected corrupt type were to mimic the reporting behavior of the honest type, public beliefs about government type would not change from their prior beliefs, but because an honest type always reports the truth and the government type is honest with positive probability, public beliefs about $k_t$ change. (The public believes that $k_t = k^d_t$ with greater likelihood whenever $k^d_t$ is reported.) As a result, expropriation would occur after report $m_t = k^d_t = k^*$ independent of government type. But this makes the corrupt type strictly worse off compared to always reporting $m_t = k^c_t$, in which case the public believes that $k_t = k^c_t$ with probability $\delta$ and expropriation does not occur. Therefore $m_t = k^d_t$ credibly reveals that $k_t = k^d_t$. 
5 Conclusions

In this paper we develop a theory of corruption between governments and foreign investors when foreign investors face risk of expropriation and contracts are not fully transparent. The focus of this analysis is on the contribution of anticipated corruption, assumed to be in the form of clandestine payments from the foreign investor to a corrupt government official, on expropriation risk and how this, in turn, influences the constrained optimal contract between the investor and the public. The dynamics of the constrained optimal contract are similar to those described in Thomas and Worrall (1994), who study the optimal, self-enforcing contract that maximizes the foreign investor’s discounted payoff when a host country is unable commit to not seizing the entire value of output in any given period. Specifically, in an environment similar to theirs, we consider the case where government type (honest or corrupt) and the amount of investment are not directly observed by the public, and find that the constrained optimal contract that maximizes host country public welfare is characterized by gradually increasing investment and back loading of all payments from the project to the host country. (Intuitively, under the threat of expropriation, postponing transfers to the host country provides a “carrot” that reduces the temptation of the host country to expropriate, and this necessitates gradually increasing investments.) Nevertheless, we show that as the possibility of corruption increases, so does the temptation to expropriate, negatively affecting contracted investment and host country returns from the contract. Moreover, a binding expropriation constraint under the contract is necessary in our model for opportunities for corrupt deals to arise, and therefore expropriation risk proliferates for corruption. This endogenous relationship between corruption and expropriation implies a channel through which corruption reduces foreign investment and output not previously considered in the literature.

In the model, it is assumed that investment levels are not directly observed by the public, and investment that is below the efficient level during the early phase of the contract implies that the corrupt official is able to generate rents by encouraging higher investment than specified under the contract. Higher anticipated corruption – captured by the likelihood that a government is corrupt – discourages FDI in the host country along two margins. On the intensive margin, higher corruption increases the public’s expectation that the value of foreign assets is above what is specified under the official contract, increasing the temptation to expropriate for every contracted sequence of investments. This lowers the amount of investment at each date under the optimal contract for a particular project. Second, as corruption increases, successively larger projects (i.e. projects involving larger initial set up costs) can no longer be supported by an optimal contract owing to the higher risk. As a result, corruption decreases foreign investment and output and delays transfers to the host country, reducing host country welfare.

By introducing stochastic government turnover into our basic setting, we also consider the case where corruption in this environment leads the optimal contract to no longer be self-enforcing, and show that expropriation is more likely to occur at moderate levels of corruption and when political turnover is high. Our model also predicts that the timing
of expropriation coincides with political turnover governments. There is some empirical
evidence to support this hypothesis. For example, Li (2009) finds that democracies are
empirically most likely to expropriate foreign investment when leaders face little political
constraint and when they reside in countries with frequent leadership turnover. Christensen (2009) further argues that different aspects of democracy may either contribute
to or minimize political risk. Specifically, he finds that competition for office and fre-
cquent government turnover increases risk and discourages investment, whereas increased
checks and balances reduces risk. Our theory suggests that the adverse effect of govern-
ment turnover on political risk faced by foreign investors may be tied to the extent of
rent seeking opportunities in a country, such as those offered by natural resource abun-
dance, when there is a lack of transparency in contracts and few checks and balances in
government decision making.

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Appendices

A Mathematical Appendix

A.A Proof of Lemma 3.4

Consider a decreasing, concave function $P \in \mathcal{P}$ and define operator $L$ by the following modified, nonconvex dynamic program:

$$LP(W) = \sup_{\{\tau,k,W\}} \tau + \beta P(W')$$

subject to

$$\mu : \tau \geq 0$$
$$\phi : pf(k) - \tau \geq 0$$
$$\lambda : pf(k) - k - \tau + \beta W' \geq W$$
$$\beta \zeta : W' \geq 0$$

Moreover, define $P^*$ as the unconstrained, first-best Pareto frontier for the problem without constraint (19). Defining $\Pi(k) = pf(k) - k$, along the first-best frontier, investment equals $k^*$, $\Pi^* = \Pi(k^*)$, and $\{\tau^*_s\}_{s=t}$ is any sequence of transfers that satisfies the remaining constraints. Given

$$W^*_t = \sum_{s=t}^\infty \beta^{s-t} (\Pi^* - \tau^*_s)$$

the first-best Pareto frontier is

$$P^*(W^*_t) = \sum_{s=t}^\infty \beta^{s-t} \tau^*_s = \sum_{s=t}^\infty \beta^{s-t} \Pi^* - W^*_t = \frac{\Pi^*}{1 - \beta} - W^*_t.$$

with $P^*(\bar{W}) = 0$. Given the definition of $W^*_t$, it is straightforward to verify that

$$\sup_{\{\tau^*_s\}_{s=t}} \tau^*_s + \beta P^*([W^*_{t+1}]) = P^*(W^*_t).$$

Therefore the solution to the maximization problem without constraint (19) satisfies $k = k^*$ and $\tau - \beta W' = \Pi^* - W$, yielding a maximum value $\Pi^*/(1 - \beta) - W = P^*(W)$. It follows that taking $LP(W)$ with constraint (19), starting from the first best frontier, $P(W') = P^*(W)$ for any $W \in [0, \bar{W}]$, $LP^*(W) \leq P^*(W)$.

The remainder of the proof follows the induction argument of Thomas and Worrall (1994) showing that, starting from $P^*(W)$, the sequence $\{L^n P^*(W)\}_{n=0}^\infty$, where $L^n$ is
the \( n^{th} \) application of \( L \), converges pointwise to \( V^c(W) \). Assume \( L^n P^* \leq L^{n-1} P^* \). Comparing \( L(L^n P^*) \) and \( L(L^{n-1} P^*) \), constraint (19) implies that the constraint set for the latter case is at least as large as the former, given \( L^n P^* \leq L^{n-1} P^* \). Therefore \( L^{n+1} P^* = L(L^n P^*) \leq L(L^{n-1} P^*) = L^n P^* \), implying \( L^n P^* \) is a decreasing sequence over a compact set converging to \( V^0 \). For any initial \( W \in [0, \bar{W}] \), consider the sequence of variables chosen at each application of \( L \), \( \{\tau^n, k^n, W^n\}_{n=1}^{\infty} \). (19) implies \( \tau^n + \beta L^n P^*(W^n) \geq \bar{V}^c(k^n) \geq 0 \) and so \( L^n P^*(W^n) \geq 0 \) for each \( n \), so in the limit \( V^0(W^n) \geq 0 \). Since \( V^0(W) \) satisfies (17)-(21) and offers the host country expected return \( V^0(W) \), \( LV^0(W) \geq V^0(W) \). However, \( L^n P^* \geq L^n P^* \geq \ldots \geq V^0 \) and hence \( L^n P^* \geq LV^0 \), and taking the limit \( n \to \infty \), \( V^0(W) \geq LV^0(W) \). Therefore \( V^0(W) = LV^0(W) \) is a fixed point of \( L \) starting from \( P^* \). Since \( P^* \geq V \), \( L^n P^* \geq L^n V^c = V^c \). In the limit we have \( V^0 \geq V^c \). By the definition of \( V^c \), \( V^0 = V^c \). \( \square \)

A.B Proof of Lemma 3.5

Assume \( P \) is a continuous, concave and bounded function, and take any \( W^1, W^2 \in [0, \bar{W}] \) with corresponding contracts \( \{\tau^1, k^1, W^1\} \) and \( \{\tau^2, k^2, W^2\} \). Next consider \( W^\alpha = \alpha W^1 + (1 - \alpha) W^2 \) for \( \alpha \in (0, 1) \) with associated contract

\[
\begin{align*}
k^\alpha &= \alpha k^1 + (1 - \alpha) k^2 \\
W^{\alpha} &= \alpha W^1 + (1 - \alpha) W^2 \\
\tau^\alpha &= \alpha \tau^1 + (1 - \alpha) \tau^2 + (1 - \delta) \left[ pf(k^\alpha) - (\alpha pf(k^1) + (1 - \alpha) pf(k^2)) \right].
\end{align*}
\]

Note that this contract satisfies (17)-(21), and that \( \tau^\alpha \geq \alpha \tau^1 + (1 - \alpha) \tau^2 \) with equality if and only if \( k^1 = k^2 \), because \( f(\cdot) \) is strictly concave. Because \( P \) is concave:

\[
LP(W^\alpha) = \sup_\theta \tau + \beta P(W^{\alpha}) \\
\geq \tau^\alpha + \beta P(W^{\alpha}) \\
\geq \alpha \tau^1 + (1 - \alpha) \tau^2 + \beta P(W^{\alpha}) \\
\geq \alpha \tau^1 + (1 - \alpha) \tau^2 + \beta \left[ P(W^1) + (1 - \alpha) P(W^2) \right] \\
= \alpha LP(W^1) + (1 - \alpha) LP(W^2).
\]

Thus \( LP(W) \) is concave. Consider two cases: (i) \( P(W^1) \) and \( P(W^2) \) correspond with the first best Pareto frontier, and (ii) at least one of \( P(W^1) \) and \( P(W^2) \) lies below the first best frontier. Because the first best frontier is linear in \( W \), \( P(W^{\alpha}) \) also corresponds with this frontier for any convex combination \( W^{\alpha} \). (See the proof of Lemma 3.4.) This implies that in case (i), \( k^1 = k^2 = k^* \) and \( k^\alpha = k^* \), and therefore \( \tau^\alpha = \alpha \tau^1 + (1 - \alpha) \tau^2 \). Because \( \sup_\theta \tau + \beta P(W') = P(W') \), where \( P^*(W') \) is the first best frontier, \( L \) maps weakly concave functions into weakly concave functions provided \( P(W') = P^*(W') \). In case (ii), at


least one of $P(W^{\alpha})$ and $P(W^{\beta})$ is below the Pareto frontier, implying at least one of $k^1$, $k^2$ is less than $k^\ast$, hence $\tau^\alpha > \alpha \tau^1 + (1 - \alpha) \tau^2$. This implies $LP(W^{\alpha}) > P(W^{\beta})$, and therefore $L$ maps weakly concave functions into strictly concave functions when $P(W)$ does not correspond with the first best frontier. Since $V^c$ is the point-wise limit of $L^n P$ from Lemma 3.4, $V^c(W)$ is itself concave, with strict concavity when $V^c(W)$ does not correspond with the first best frontier.

Next, to see why $\partial V^c_t / \partial W_t^c \leq -1$ for all $t$, suppose to the contrary that $-\partial V^c_t / \partial W_t^c = \lambda_t < 1$ for some $t = \tilde{t}$. By concavity of $V^c$, if this is true anywhere it is certainly true at the minimum value $W^c_t = 0$. Then condition (12) implies that

$$\varphi_{\tilde{t}} = (1 - \lambda_{\tilde{t}}) + \mu_{\tilde{t}} + \phi_{\tilde{t}} > 0$$

and by complementary slackness $\tau_{\tilde{t}} = pf(k_{\tilde{t}}^c) (\mu_{\tilde{t}} = 0)$ and the investor’s profits are negative in period $\tilde{t}$. Constraint (9) then implies $W^c_{\tilde{t}+1} \geq W^c_{\tilde{t}} \geq 0$ (the first inequality is strict whenever $k_{\tilde{t}}^c > 0$). If $k_{\tilde{t}}^c = 0$, then $\tau_{\tilde{t}} = pf(k_{\tilde{t}}^c) = 0$ and therefore $W^c_{\tilde{t}+1} = W^c_{\tilde{t}} = 0$. But if a non-trivial contract featuring positive investment in finite time exists from period 0 onwards, promising the investor discounted expected return at least equal to $I_0 \geq 0$ while satisfying (8) and offering the host country $\tau_{0} + \beta E_t[V^c_t] > 0$, then it is also feasible to deliver a strictly positive expected return to the host country from any period $\tilde{t}$ onwards given promise $W^c_{\tilde{t}} = 0$ which would require positive investment on some future date. This implies that if $\varphi_{\tilde{t}} > 0, \tau_{\tilde{t}} = pf(k_{\tilde{t}}^c) > 0$ and hence $W^c_{\tilde{t}+1} > W^c_{\tilde{t}} = 0$. Complementary slackness then implies $\zeta_{\tilde{t}} = 0$, and $\lambda_{\tilde{t}+1} = (\lambda_{\tilde{t}} + \zeta_{\tilde{t}})/(1 + \phi_{\tilde{t}}) = \lambda_{\tilde{t}}/(1 + \phi_{\tilde{t}}) \leq \lambda_{\tilde{t}} < 1$. Repeating the argument for period $\tilde{t} + 1$, it immediately follows that $\lambda_{\tilde{t}+n+1} \leq \lambda_{\tilde{t}+n} \leq 1$ for all $n > 0$. But then $\tau_{\tilde{t}} = pf(k_{\tilde{t}}^c)$ for all $t \geq \tilde{t}$, which violates the condition $W^c_t \geq 0$. Therefore it must be the case that $\lambda_t \geq 1$ for all $t$.

Finally, because $\lambda_t \geq 1$ for all $t$, whenever $\varphi_t > 0$ then we must also have $\phi_t > 0$ (since $\mu_t = 0$). Since $\varphi_t > 0$ implies $\tau_t = pf(k_t^c)$, (8) becomes

$$V^c_{t+1} \geq \frac{\delta}{\beta} (pf(k^*) - pf(k_t^c))$$

and if $\phi_t > 0$, this constraint binds. But if $\delta > 0$, this cannot bind because it is possible to increase $k_t^c$ and hence also increase $\tau_t$ while holding $W^c_{t+1}$ constant without violating (9). If $\delta = 0$, then the constraint reduces to $V^c_{t+1} \geq 0$, which never binds under the condition $\tau_t \geq 0$. Therefore $\varphi_t = 0$ and (5) never binds.
A.C  Proof of Proposition 3.7

From Lemma 3.5, $\varphi_t = 0$ and $\lambda_t = 1 + \mu_t + \phi_t$ and $pf'(k^c_t) = \lambda_t/(\lambda_t - \phi_t(1 - \delta))$ for all $t$. Moreover, Equations (14) and (15) imply

$$\lambda_{t+1} = \frac{\lambda_t + \zeta_t}{1 + \phi_t}.$$ 

Consider a stationary contract in which investment is constant, $k_t = \hat{k} \leq k^*$, and where $\lambda_t = \lambda_{t+1} = \hat{\lambda}$, so that $(1 + \hat{\phi})\hat{\lambda} = \lambda + \hat{\zeta}$. If $\hat{\phi} > 0$, then $\hat{\zeta} > 0$ and thus $W^c_{t+1} = 0$ binds for all $t$. In this case (8) binds ($k \leq k^*$) and (9) binds for $W^c_t = W^c_{t+1} = 0$. This implies the stationary contract $\hat{k}$ with $\tau_t = \hat{\tau}$ solves

$$\sum_{t=s}^{\infty} \beta^{t-s} \hat{\tau} = \frac{\hat{\tau}}{1 - \beta} = \delta pf(\hat{k}^*) + (1 - \delta)pf(\hat{k})$$

and

$$pf(\hat{k}) - \hat{k} = \hat{\tau}$$

which implies $\hat{k}$ the solution to

$$\hat{k} = \beta pf(\hat{k}) - \delta (1 - \beta)[pf(k^*) - pf(\hat{k})]$$

for $0 < \hat{k} \leq k^*$. Note that for sufficiently high values of $\delta$, there does not exist $\hat{k} > 0$ that solves this equality, in which case a non-trivial stationary contract does not exist. (Conditions for existence are considered in Propositions 3.8 and 3.8.) Also note that only if $\hat{\phi} = 0$ and hence $\hat{k} = k^*$ (Lemma 3.6) is it the case that $\hat{\zeta} = 0$ ($\hat{\lambda} = 1$) and $W^c_{t+1} = 0$ never binds in the stationary contract. This corresponds to a contract on the first best Pareto frontier, where $V$ attains its maximum value, and $\tau_t$ and $W^c_{t+1}$ are not uniquely determined in any period.

Assuming for the moment that a non-trivial stationary contract exists ($\hat{k} > 0$), the optimal contract converges to this stationary contract period. This follows from $\lambda_{t+1} \leq \lambda_t$ for all $t$. To see why, suppose instead that $\lambda_{t+1} > \lambda_t$ for some $t$. Then $(1 + \phi_t)\lambda_t < \lambda_t + \zeta_t$ which implies $\zeta_t > 0$ and hence $W^c_{t+1}$ binds. This would imply $W^c_t \geq W^c_{t+1}$, and by the concavity of $V^c$, $\partial V^c_{t+1}/\partial W^c_{t+1} \geq \partial V^c_t/\partial W^c_t$. But then by the envelope theorem we have $\lambda_{t+1} \leq \lambda_t$, a contradiction. Therefore $\lambda_{t+1} \leq \lambda_t$, and since $\lambda_t \geq 1$ for all $t$, $\lambda_t$ must converge to some value $\hat{\lambda} > 1$. Assume for the moment that convergence occurs in finite time in some period $t^*$. Then either $\lambda_t = \hat{\lambda} = 1$ for all $t \geq t^*$, implying $\hat{\zeta} = \hat{\phi} = 0$ and $W^c_t \geq 0$ for $t \geq t^*$ (Case 1), or $\hat{\lambda} > 1$, implying $\zeta_t = \hat{\zeta} > 0$, $\phi_t = \hat{\phi} > 0$, and $W^c_t = 0$ for all $t \geq t^*$ (Case 2). Case 1 corresponds to the efficient stationary contract, where $k_t = \hat{k} = k^*$ for all $t$ and the first best Pareto frontier is reached, whereas in Case 2 $\hat{k} \geq k^*$. Since $W_0 \geq I_0$ and $I_0 > 0$ by assumption, we know $\lambda_1 = \lambda_0$ and therefore $t^* = 0$ if and only if the first best frontier can be immediately reached in the initial period of the
contract. Otherwise $t^* > 0$ and there is a positive transition period towards the stationary contract where either $\zeta_t = 0$ and $W^c_t > W^c_{t+1} \geq 0$ for all $t < t^*$, or else $t = t^* - 1$, $\zeta_t > 0$ and $W^c_t > W^c_{t+1} = 0$ (but $\zeta_t = 0$ for $t < t^* - 1$). In both cases, $\lambda_{t+1} < \lambda_t$ for all $t < t^*$. We now argue that if a non-trivial optimal contract exists, $t^*$ is reached in finite time, and under this contract $\tau_t = 0$ until period $t^* - 1$.

Consider any period $t < t^*$ along the transition to the stationary contract such that $W^c_t > W^c_{t+1}$. Substituting $\lambda_t = 1 + \mu_t + \phi_t$ into the above expression for $\lambda_{t+1}$, we have $\lambda_{t+1} = (1 + \phi_t + \mu_t + \zeta_t)/(1 + \phi_t)$. Because $\lambda_{t+1} < \lambda_t$ when $t < t^*$, one of the following sets of conditions must hold:

(i) $\mu_t = 0$, $\zeta_t = 0$, and $\lambda_{t+1} = \lambda = 1$;

(ii) $\mu_t = 0$, $\zeta_t > 0$ ($t = t^* - 1$), and $\lambda_{t+1} = \lambda > 1$;

(iii) $\mu_t > 0$ and $\lambda_{t+1} > \lambda$.

Cases (i) and (ii), the stationary contract is reached in period $t + 1$ (hence $t = t^* - 1$). For all other $t < t^*$, $\mu_t > 0$, implying that $\tau_t \geq 0$ strictly binds. The optimal contract therefore features zero transfers to the host country until the period just before the stationary contract is reached. Because $\beta \in (0, 1)$, $V_0 > 0$ (if a non-trivial contract exists) and $\tau_t = 0$ for $t < t^* - 1$ imply $t^*$ must be finite.

Finally, given $\lambda_t$ is strictly decreasing and $\phi_t > 0$ for all $t < t^*$, concavity of $V^c(W_t)$ implies $W_t$ is decreasing and $V_t$ is increasing with $t < t^*$. Therefore $V^c_{t+1} - V^c_t > 0$ along the transition to the stationary contract, and given $\tau_t = \tau_{t-1} = 0$ and (8) strictly binds at $t$ and $t - 1$, this implies

$$
\beta(V^c_{t+1} - V^c_t) = (1 - \delta)(pf(k^c_t) - pf(k^c_{t-1})) > 0.
$$

Therefore $k^c_t > k^c_{t-1}$ whenever $t < t^*$.

\[ \square \]

A.D Proof of Proposition 3.8

An optimal contract converging to stationary investment $\hat{k}$ must satisfy Condition (8) for all $t \geq t^*$:

$$
V^{max}(\beta) \geq \delta pf(k^*) + (1 - \delta)pf(\hat{k})
$$

where

$$
V^{max}(\beta) = \sum_{s=t^*}^{\infty} \beta^{s-t^*} \tau_s = \sum_{s=t^*}^{\infty} \beta^{s-t^*} (pf(\hat{k}) - \hat{k}) = \frac{pf(\hat{k}) - \hat{k}}{1 - \beta}.
$$

It is useful to begin by defining $\beta(\delta)$ as the minimum value of $\beta$ that supports any particular stationary investment level $\hat{k}$, given $\delta$:

$$
\beta(\hat{k}) = \frac{\hat{k} + \delta(pf(k^*) - pf(\hat{k}))}{pf(\hat{k}) + \delta(pf(k^*) - pf(\hat{k}))}
$$
as well as the minimum value of $\beta$ that supports $\hat{k} = k^*$, $\overline{\beta} = k^*/pf(k^*)$. We are interested in the relationship $\hat{\beta}(\delta)$ that defines the value of $\beta$ below which there is no $\hat{k} > 0$ that can supported as a stationary contract, given $\delta$. This can be expressed as

$$\hat{\beta}(\delta) = \inf_{k \in [0,k^*]} \beta(\hat{k}).$$

Denoting $\hat{k}_{\text{min}}(\delta) = \arg \min_k \beta(\delta)$, evaluating the derivative of $\beta(\delta)$ with respect to $\hat{k}$ reveals that $\hat{k}_{\text{min}}(\delta)$ satisfies

$$pf'(\hat{k}) = \frac{\left((\delta pf(k^*) + (1-\delta)pf(\hat{k}))\right)}{\left(\delta pf(k^*) + (1-\delta)k\right)}.$$

Note that at $\delta = 0$, $\hat{k}_{\text{min}}(\delta) = 0$ solves $pf'(\hat{k})\hat{k} = pf(\hat{k})$, implying that $\hat{\beta}(0) = 0$. Moreover, as $\delta \to 0$, $\hat{k}_{\text{min}}(\delta)$ approaches zero. If $\delta = 1$, $\hat{k}_{\text{min}}(\delta) = k^*$ solves $pf'(\hat{k}) = 1$, and therefore $\hat{\beta}(1) = \overline{\beta}$.

For $\delta > 0$, $\hat{k}_{\text{min}}(\delta) > 0$. We show that $\hat{\beta}(\delta)$ is strictly increasing on $\delta \in [0,1)$, converging asymptotically to $\overline{\beta}$ as $\delta$ approaches $1$ from below. Moreover $k^*$ can be supported as a stationary contract (if one exists) if and only if $\beta \geq \overline{\beta}$.

Because $\beta(\delta)$ and $\hat{k}_{\text{min}}(\delta)$ are continuous and differentiable in $\delta$, by the envelope theorem we can determine the slope of $\hat{\beta}(\delta)$ by the slope of $\beta(\delta)$ evaluated at $\hat{k} = \hat{k}_{\text{min}}(\delta)$:

$$\frac{\partial \beta(\delta)}{\partial \delta} \bigg|_{\hat{k} = \hat{k}_{\text{min}}(\delta)} = \frac{(pf(k^*) - pf(\hat{k}_{\text{min}}(\delta)))(pf(\hat{k}_{\text{min}}(\delta)) - \hat{k}_{\text{min}}(\delta))}{(\delta pf(k^*) + (1-\delta)pf(\hat{k}_{\text{min}}(\delta)))} \geq 0.$$

We know from above that $\hat{k}_{\text{min}}(\delta) \to 0$ when $\delta \to 0$. This also implies that $\partial \hat{\beta}(\delta)/\partial \delta \to \infty$ as $\delta \to 0$. Moreover, when $\delta = 1$, $\hat{k}_{\text{min}}(\delta) = k^*$ and therefore $\partial \hat{\beta}(\delta)/\partial \delta = 0$. Finally, for $\delta > 0$ and $\hat{k}_{\text{min}}(\delta) < k^*$, $\partial \beta(\delta)/\partial \delta > 0$. Therefore $\hat{\beta}(0) = 0$, $\hat{\beta}(1) = \overline{\beta}$, $\beta(\delta)$ is strictly increasing on $\delta \in [0,1)$, and converges asymptotically to $\overline{\beta}$ as $\delta$ approaches $1$.  

### A.E Proof of Proposition 3.9

Given the Pareto frontier $V^c(W^c)$ is concave and strictly decreasing in $W^c$ (Lemma 3.5), define $W^{max}$ as the maximum value of $W^c$ such that $V^{min} = V^c(W^{max})$ is the minimum initial promised utility to the host country under an optimal contract. (Evidently $V^{min} > 0$ under a non-trivial contract, solving condition (8) with equality given $k^*_0 > 0$). The optimal contract, if one exists, must offer the investor a return $W_0 \geq I_0$, and therefore $W^{max}$ represents the threshold level for $I_0$ above which a non-trivial optimal contract does not exist. As $V^c(W^c)$ depends on $\beta$ and $\delta$, so does $W^{max}$. Define $\overline{I}(\beta, \delta)$ to be this threshold for start up costs $I_0$, given $\beta$ and $\delta$.

Under the optimal contract such that (8) binds in the transition to the stationary con-
tract period, \( \tau_0 = 0 \). Condition (9) at period \( t = 0 \) can therefore be re-written as \( W_0^c = pf(k_0^c) - k_0^c + \beta W_1^c \), while (8) becomes

\[
V_0^c = \beta V_1^c = \beta V^c(W_1^c) \geq \delta pf(k^*) - (1 - \delta) pf(k_0^c).
\]

Given \( W_0^c \) and \( V^c(W^c) \), the optimal contract when (8) binds is summarized by the pair \( \{k_0^c, W_1^c\} \) that solve these two conditions. Therefore, the maximum value for \( W_0^c \) given \( V^c(W^c) \) is the solution to

\[
\max_{k_0^c, W_1^c} W_0^c = pf(k_0^c) - k_0^c + \beta W_1^c
\]

subject to \( \beta V^c(W_1^c) - \delta pf(k^*) - (1 - \delta) pf(k_0^c) = 0 \).

Note that the expression for \( W_0^c \) is concave and the constraint is convex given \( V^c(W^c) \) is concave. According to the envelope condition, we have

\[
\frac{\partial W_0^c}{\partial \delta} = W_1^c + \gamma V^c(W_1^c) > 0
\]
\[
\frac{\partial W_0^c}{\partial \beta} = -\gamma(pf(k^*) - pf(k_0^c)) < 0
\]

where \( \gamma \geq 0 \) is the multiplier on the constraint, and the derivatives are evaluated at the optimized solution \( \{k_0^c, W_1^c\} \). Recognizing that \( W_0^c \) evaluated at the solution equals \( I(\beta, \delta) \), these conditions show that \( I(\beta, \delta) \) is strictly increasing in \( \beta \) and strictly decreasing in \( \delta \) whenever (8) strictly binds \( (k_0^c < k^*) \).

To see that \( k_0^c \) is strictly decreasing in \( \delta \) whenever \( k_0^c < k^* \) consider \( \delta'' > \delta' \), note that by the envelope condition, \( \partial V_t / \partial W_t = -\phi_t(pf(k^*) - pf(k_t^c)) < 0 \) for all \( t \) in which (8) binds. This implies that the Pareto frontier \( V''(W) \) corresponding to \( \delta'' \) lies strictly below the frontier \( V''(W) \) at \( \delta' \) wherever \( V''(W) \) is below the first best Pareto frontier. Hence for any period \( t \) of the contract, beginning in period 0, before the first best frontier is reached (if at all), we have

\[
V''(W_{t+1}^c) < V''(W_{t+1}^c')
\]

where \( W_{t+1}^c \) and \( W_{t+1}^c' \) correspond to the optimal contract under \( \delta' \) and \( \delta'' \). But this also implies that \( W''_{t+1} > W'_{t+1} \) and, by promise the promise keeping constraint, we know \( k_t^c < k_t' \). If this were not the case, then given \( V_t = \beta V^c(W_{t+1}^c) = \delta pf(k^*) + (1 - \delta) pf(k_t^c) \), and \( \delta'' > \delta' \), \( k_t^c \geq k_t' \) would imply \( V''(W_{t+1}^c) > V'(W_{t+1}^c') \).

\[\square\]

\section*{A.F Proof of Proposition 4.1}

If following the first report \( m_t = k_t^d \) the public does not choose to expropriate under the contract, investors, knowing that expropriation will not occur and \( \rho_t = 0 \) when \( k_t^d \neq k_t^c \),
choose \( k^d_t = k^* \). This then implies that the contract satisfies
\[
\tau_t + \beta E_t[V_{t+1}(m_{t+1})|k^d_t] \geq pf(k^*).
\]
But if the optimal contract satisfies this condition then \( k^c_t = k^* \) is optimal at time \( t \), since it offers higher investment without increasing the risk of expropriation. Therefore if expropriation does not occur, it must be the case that \( k^d_t = k^c_t \). However, unless \( k^c_t = k^* \), this is not an equilibrium. Therefore under a corrupt regime the probability of expropriation is
\[
\rho_t = \bar{\rho} = \sigma \delta (1 - \delta) \text{ for all } t \text{ such that } k^c_t < k^* \text{ and } k^d_t \text{ solves } pf'(k_t) = (1 - \bar{\rho})^{-1}.
\]

A.G Proof of Proposition 4.2

Assigning multipliers \( \phi_t, \mu_t, \lambda_t, \beta \zeta_t \) and \( \phi_t \) to constraints (4), (5), (9)-(10) and (16) and recalling that \( \varphi_t = 0 \), the corresponding first order conditions to the dynamic program are
\[
\lambda_t = (1 - \bar{\rho}) + \mu_t + \phi_t \tag{22}
\]
\[
pf'(k^c_t) = \frac{\lambda_t}{\lambda_t - (1 - \delta)\phi_t} \tag{23}
\]
\[
\frac{\partial V^c_{t+1}}{\partial W^c_{t+1}} = -\frac{\lambda_t + \zeta_t}{(1 - \bar{\rho}) + \phi_t} \tag{24}
\]
as well as envelope condition
\[
\frac{\partial V^c_t}{\partial W^c_t} = -\lambda_t.
\]
Substituting \( \lambda_t = 1 - \bar{\rho} + \mu_t + \phi_t \) into Condition (24) yields
\[
-\frac{\partial V^c_{t+1}}{\partial W^c_{t+1}} = 1 + \frac{\mu_t + \zeta_t}{1 - \bar{\rho} + \phi_t} \geq 1.
\]
Provided \( \zeta_t > 0 \) and the investor is still promised positive future utility, \( \lambda_{t+1} > 1 \) and \( \mu_t > 0 \). Therefore transfers are zero until either the efficient frontier is reached (at which point the timing of transfers is no longer uniquely determined), or until the investor has completely recovered \( I_0 \) and \( W^c_{t+1} = 0 \). Moreover, as long as \( \lambda_{t+1} < \lambda_t \) and the contract is converging to a stationary contract \( \lambda_t = \lambda_{t+1} = \hat{\lambda} \), it must be the case that \( \phi_t > 1 - \bar{\rho} \) which implies \( k^c_t < k^* \). Moreover, \( k^c_t \) is strictly increasing over time along the transition to the stationary contract following an argument analogous to Proposition 3.7.

In the stationary contract period, \( \lambda_t = \lambda_{t+1} = \hat{\lambda} \) and \( \hat{\lambda} (\phi - \bar{\rho}) = \hat{\zeta} \). Since in the stationary contract \( \hat{\mu} = 0 \) and \( \hat{\lambda} \geq 1, \hat{\phi} \geq \bar{\rho} \). If \( \phi > \bar{\rho} \), then \( \hat{\zeta} \geq (\phi - \bar{\rho}) \) and \( W_t \geq 0 \) must bind. Only if \( \phi = \bar{\rho} = 0 \) and the efficient frontier is reached is it the case that \( \hat{\zeta} = 0 \) and this non-negativity constraint never binds in the stationary contract period.