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Mamadou Lah. The Economics of Informality: The Financing of the Informal Economy, criminal activities and nonregulatory capital. 2024. halshs-04721877

HAL Id: halshs-04721877

<https://shs.hal.science/halshs-04721877v1>

Preprint submitted on 4 Oct 2024

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WORKING PAPER N° 2024-41

The Economics of Informality: The Financing of the Informal Economy, criminal activities and nonregulatory capital

Mamadou Lah

JEL Codes: O11; O17; O50; O38; H26; G18; G28

Keywords: Formal and Informal sector, criminal sector, nonregulatory capital, taxation, optimal policy



**The Economics of Informality:
The Financing of the Informal Economy, criminal activities and
nonregulatory capital**

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September 2024

Abstract

The coexistence of formal, informal, and criminal sectors in developing economies presents a complex challenge for policymakers seeking to promote sustainable growth and development. Foreign capital inflows can play a significant role in influencing the dynamics of these economic sectors, with the potential to either enhance or hinder economic progress. This paper develops a theoretical model that examines how a small open economy receives and allocates foreign capital across these distinct sectors. Our model uniquely incorporates mechanisms for the detection and penalization of capital flows directed towards the informal and criminal sectors, assessing the risks and regulatory responses associated with these investments. Moreover, the model posits that the criminal sector exerts a rent-extracting impact on the productive sectors, siphoning a fraction of their outputs.

Numerical simulations reveal that stringent enforcement of penalties and effective detection mechanisms can substantially diminish the criminal sector's influence while simultaneously promoting growth within the formal sector. Striking a balance in regulating the informal sector is crucial, as over-regulation can stifle entrepreneurial spirit while under-regulation may not adequately curtail the negative externalities associated with informal economic activities. Differentiated policies that clearly distinguish between informal and criminal activities are more effective.

The model further identifies an inverse relationship between the rents extracted by the criminal sector and the stringency of policies targeting capital flows into the criminal and informal sectors. There is a trade-off between the beneficial impacts of control policies on the formal sector and their detrimental effects on the informal sector, prompting the need for optimal regulation levels. When the formal sector is less exposed to the criminal sector, there tends to be an increase in formal output and a reduction in both informal production and criminal activities, leading to a decrease in optimal Gross National Product (GNP). This phenomenon underscores the diminishing returns to scale and highlights the complex interactions between sectorial productivity and criminal interference.

These findings underscore the necessity for targeted and nuanced policy measures that can adeptly manage the intricate relationships between different economic sectors in the presence of foreign capital. By strategically regulating and guiding these capital flows, governments can enhance economic stability and promote inclusive growth.

JEL classification: O11; O17; O50; O38; H26; G18; G28

Keywords: Formal and Informal sector, criminal sector, nonregulatory capital, taxation, optimal policy

Résumé

La coexistence des secteurs formel, informel et criminel dans les économies en développement représente un défi complexe pour les décideurs politiques qui cherchent à promouvoir une croissance et un développement durables. Les entrées de capitaux étrangers peuvent jouer un rôle important dans l'influence de la dynamique de ces secteurs économiques, avec le potentiel d'améliorer ou d'entraver le progrès économique. Cet article développe un modèle théorique qui examine comment une petite économie ouverte reçoit et alloue les capitaux étrangers entre ces différents secteurs. Notre modèle intègre de manière unique des mécanismes de détection et de pénalisation des flux de capitaux dirigés vers les secteurs informel et criminel, évaluant les risques et les réponses réglementaires associés à ces investissements. De plus, le modèle postule que le secteur criminel exerce un impact d'extraction de rente sur les secteurs productifs, siphonnant une fraction de leurs outputs.

Les simulations numériques révèlent qu'une application stricte des pénalités et des mécanismes de détection efficaces peuvent considérablement diminuer l'influence du secteur criminel tout en favorisant simultanément la croissance au sein du secteur formel. Il est crucial de trouver un équilibre dans la régulation du secteur informel, car une régulation excessive peut étouffer l'esprit d'entreprise tandis qu'une régulation insuffisante peut ne pas suffire à réduire les externalités négatives associées aux activités économiques informelles. Des politiques différenciées qui distinguent clairement entre les activités informelles et criminelles sont plus efficaces.

Le modèle identifie également une relation inverse entre les rentes extraites par le secteur criminel et la rigueur des politiques ciblant les flux de capitaux vers les secteurs criminel et informel. Il existe un arbitrage entre les impacts bénéfiques des politiques de contrôle sur le secteur formel et leurs effets néfastes sur le secteur informel, ce qui incite à la recherche de niveaux de régulation optimaux. Lorsque le secteur formel est moins exposé au secteur criminel, on observe généralement une augmentation de la production formelle et une réduction de la production informelle et des activités criminelles, ce qui entraîne une diminution du produit national brut (PNB) optimal. Ce phénomène souligne les rendements d'échelle décroissants et met en évidence les interactions complexes entre la productivité sectorielle et l'ingérence criminelle.

Ces résultats soulignent la nécessité de mesures politiques ciblées et nuancées qui peuvent gérer adroitement les relations complexes entre les différents secteurs économiques en présence de capitaux étrangers. En régulant et en orientant stratégiquement ces flux de capitaux, les gouvernements peuvent améliorer la stabilité économique et promouvoir une croissance inclusive.

Classification JEL: O11; O17; O50; O38; H26; G18; G28

Mots-clés : Secteur formel et informel, secteur criminel, capital non réglementaire, taxation, politique optimale

Table of contents

ABSTRACT	II
RÉSUMÉ	III
LIST OF FIGURES	V
1. INTRODUCTION	1
2. LITERATURE REVIEW:	5
3. MODEL	7
3.1. JUSTIFICATION AND DISCUSSION OF HYPOTHESES	7
3.2. PRODUCTION	9
3.3. SOURCES OF CAPITAL	10
3.4. MAXIMIZATION OF PROFIT	13
3.5. EQUILIBRIUM	14
4. MODEL PARAMETERIZATION, COMPARATIVE STATICS, AND OPTIMAL POLICY	16
4.1. IMPACT OF GAMMA	18
4.1.1. <i>Impact of γ on τ:</i>	18
4.1.2. <i>Impact of γ on criminal production Y_c:</i>	19
4.1.3. <i>Impact of γ on formal sector production Y_f</i>	20
4.1.4. <i>Impact of γ on informal sector production Y_i</i>	20
4.1.5. <i>Impact of γ On $GNP = Y_f + Y_i$</i>	21
4.2. OPTIMAL POLICY	21
4.3. FIRST-BEST POLICY	22
5. EXTENSION OF THE MODEL	23
5.1. EXTENSION 1: WHAT HAPPENS TO THE GOVERNMENT'S ARBITRATION WHEN THE FORMAL AND INFORMAL SECTOR ARE NOT TAXED AT THE SAME RATE BY CRIMINAL SECTOR?	24
5.1.1. <i>Case 1: $\theta = 1$</i>	25
5.1.2. <i>Case 2: $\theta = 1/2$</i>	25
5.1.3. <i>Case 3: $\theta = 0$</i>	26
5.2. WHAT HAPPENS TO THE GOVERNMENT'S ARBITRATION WHEN THE FINANCIAL SANCTIONS SUFFERED BY THE INFORMAL SECTOR AND THE CRIMINAL SECTOR DIFFER IN THE EVENT OF DETECTION BY PUBLIC AUTHORITIES?	28
5.2.1. <i>Impact of γc on τ:</i>	29
5.2.2. <i>Impact of γc on criminal production Y_c:</i>	30
5.2.3. <i>Impact of γc on formal sector production Y_f:</i>	30
5.2.4. <i>Impact of γc on informal sector production Y_i:</i>	30
5.2.5. <i>Impact of γc on $GNP = Y_f + Y_i$</i>	31
5.2.6. <i>Optimal policy</i>	32
6. FROM THEORY TO REALITY: EMPIRICAL AND ANECDOTAL EVIDENCE SUPPORTING OUR THEORETICAL MODEL	34
6.1. REDUCTION OF THE CRIMINAL SECTOR THROUGH ENHANCED PENALTIES AND DETECTION:	34
6.2. BALANCING REGULATION OF INFORMAL ECONOMIC ACTIVITIES:	35
6.3. DIFFERENTIATING BETWEEN INFORMAL AND CRIMINAL SECTORS IN POLICY IMPLEMENTATION:	35
7. WRONG SIDE OF THE LAFFER CURVE OF CRIME τ	36
8. CONCLUSION	37

List of figures

FIGURE 1: SOLUTION OF THE MODEL	39
FIGURE 2: RELATION BETWEEN γ AND τ	39
FIGURE 3: RELATION BETWEEN Y_c AND τ	39
FIGURE 4: RELATION BETWEEN Y_f AND τ	39
FIGURE 5: RELATION BETWEEN Y_i AND τ	39
FIGURE 6: RELATION BETWEEN $(PNB = Y_f + Y_i)$ AND τ	39
FIGURE 7: MAXIMIZATION OF $(GNB = Y_f + Y_i)$: 1 ST BEST AND 2 ND BEST	39
FIGURE 9: CALIBRATED SOLUTION OF THE MODEL IN τ IF $\theta = 1/2$	40
FIGURE 8: RELATION BETWEEN γ AND τ IF $\theta = 1/2$	40
FIGURE 10: RELATION BETWEEN Y_i AND τ IF $\theta = 1/2$	40
FIGURE 11: RELATION BETWEEN Y_f AND τ IF $\theta = 1/2$	40
FIGURE 12: RELATION BETWEEN $(GNB = Y_f + Y_i)$ AND τ IF $\theta = 1/2$	40
FIGURE 13: RELATION BETWEEN Y_c AND τ IF $\theta = 1/2$	40
FIGURE 15: RELATION BETWEEN γ_c AND τ WHEN THE GOVERNMENT SPECIFICALLY TARGETS CRIMINAL ACTIVITIES	41
FIGURE 14: RELATION BETWEEN Y_c AND τ WHEN THE GOVERNMENT SPECIFICALLY TARGETS CRIMINAL ACTIVITIES	41
FIGURE 16: RELATION BETWEEN $(GNB = Y_f + Y_i)$ AND τ WHEN THE GOVERNMENT SPECIFICALLY TARGETS CRIMINAL ACTIVITIES	41
FIGURE 17: RELATION BETWEEN Y_i AND τ WHEN THE GOVERNMENT SPECIFICALLY TARGETS CRIMINAL ACTIVITIES	41

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September 2024

1. Introduction

One of the major challenges faced by formal and informal economies in many countries is the predation of the criminal sector, which seeks to appropriate their resources and opportunities. In practice, these three sectors coexist and interact in all economies worldwide. The formal economy encompasses all economic activities that are regulated, recorded, and taxed by government authorities. On the other hand, the informal¹ economy includes all economic activities that escape the control and regulation of the state, either by choice or necessity. Depending on compliance with prevailing social and legal norms, the informal economy can be classified as legal or illegal. The criminal sector², for its part, includes activities considered delinquent or criminal by society. Individuals operating in this sector do not work in the traditional sense of the term, but rather carry out activities aimed at appropriating a portion of the resources produced by others. They can be considered as rent-seekers.

The extent of these three sectors can be accentuated by external funding sources³ that can be used to finance formal, informal, and criminal activities. The criminal sector generates

¹ The informal economy accounts for a significant share of global employment, particularly in developing countries. Estimates suggest that informal employment represents over half of the world's non-agricultural workforce (International Labor Organization, 2024).

² The criminal sector's hidden toll: The criminal sector generates substantial illicit revenues, estimated to trillions of dollars annually. These illicit activities not only distort markets and fuel corruption but also pose a threat to public safety and undermine the rule of law (Global Financial Integrity, n.d.).

³ Capital flows: A double-edged sword: Foreign capital inflows can act as a catalyst for economic growth, providing access to financing, technology, and new markets. However, these inflows can also be misallocated,

resources by appropriating those of other sectors. By its nature, it is therefore an inefficient sector. When funds come from abroad, their impact on the economy depends on the sector in which they are invested - this can be beneficial or harmful. A policy aimed at promoting growth or development must take into account the factors that guide the investment of these funds towards the appropriate sectors.

This paper delves into the specific dynamics of capital flows within developing economies characterized by the coexistence of formal, informal, and criminal sectors. We develop a theoretical model that examines how a small open economy⁴ receives and allocates foreign capital across these distinct sectors. Our model uniquely incorporates mechanisms for the detection and penalization of capital flows directed towards the informal and criminal sectors, assessing the risks and regulatory responses associated with these investments. Moreover, the model posits that the criminal sector exerts a rent-extracting impact on the productive sectors, siphoning a fraction of their outputs.

We undertake a numerical analysis to scrutinize the influence of various parameters and to simulate different scenarios under a range of policy interventions. This approach allows us to meticulously explore how specific government actions aimed at controlling and directing foreign capital can significantly affect sectorial productivity and overall economic health.

Preliminary results from our analysis indicate that:

fueling informal or criminal activities and exacerbating existing economic inequalities. Agnello and Sousa [2012], in their research, they found that banking crises have a significant effect on income distribution. They observed that inequality increases before banking crisis episodes and sharply declines afterwards. They also found that while a large government size does not per se seem to reduce inequality, a rise in financial depth (i.e., better access to credit provided by the banking sector) contributes to a more equal distribution of income.

So, in the context of foreign capital inflows, they can indeed act as a catalyst for economic growth by providing access to financing, technology, and new markets. However, these inflows can also be misallocated, potentially fueling informal or criminal activities and exacerbating existing economic inequalities. This is why they are often referred to as a “double-edged sword”. It’s important to manage these inflows effectively to maximize their benefits and minimize potential negative impacts.

⁴ Such economies are particularly vulnerable to the influences of external funding, which can either stimulate growth or exacerbate existing challenges. The allocation of foreign capital across the formal, informal, and criminal sectors has profound implications for economic stability, growth, and the efficacy of government policies aimed at regulation and control.

- **Enforcement of Penalties and Detection:** Implementing robust detection mechanisms and stringent penalties substantially diminishes the size and influence of the criminal sector while simultaneously promoting growth within the formal sector.
- **Regulatory Balance:** There is a delicate balance to be maintained in regulating the informal sector. Over-regulation can stifle entrepreneurial spirit and constrain economic contributions, whereas under-regulation may not adequately curtail the negative externalities associated with informal economic activities.
- **Policy Differentiation:** The most effective policies are those that clearly distinguish between the informal and criminal activities. By imposing strict controls and higher penalties on criminal behaviours while supporting the informal sector's formalization and growth with less restrictive measures, governments can foster a healthier economic environment.

Further insights from the model indicate that:

- **Inverse Relationship:** There is a notable inverse relationship between the rents extracted by the criminal sector and the stringency of policies targeting capital flows into the criminal and informal sectors.
- **Sectorial Trade-offs:** The model identifies a trade-off between the beneficial impacts of control policies on the formal sector and their detrimental effects on the informal sector, prompting the need for optimal regulation levels.
- **Sector Exposure:** When the formal sector is less exposed to the criminal sector, there tends to be an increase in formal output and a reduction in both informal production and criminal activities, leading to a decrease in optimal Gross National Product (GNP). This phenomenon underscores the diminishing returns to scale and highlights the complex interactions between sectorial productivity and criminal interference.
- **Policy Implications:** To maximize GNP, it is more advantageous for the government to intensify efforts against the criminal sector particularly when the formal sector's exposure to criminal activities is minimized.

These findings underscore the necessity for targeted and nuanced policy measures that can adeptly manage the intricate relationships between different economic sectors in the presence of foreign capital. By strategically regulating and guiding these capital flows, governments can enhance economic stability and promote inclusive growth.

To further substantiate our theoretical findings, we draw upon a range of empirical evidence and real-world anecdotes that illuminate the complex dynamics of the informal and criminal sectors in response to foreign capital inflows and policy interventions.

India's Demonetization Initiative: One of the most striking examples of a policy aimed at curtailing illegal financial flows and reducing the size of the informal and criminal sectors is India's 2016 demonetization initiative. The government's sudden withdrawal of high-denomination currency notes was primarily targeted at black money, often held in cash to avoid taxation and regulation. While the immediate aftermath saw a significant disruption in the informal sector due to cash shortages, the criminal sector was also impacted as their primary medium of transaction was invalidated overnight. However, the resilience of these sectors was notable; many informal businesses quickly adapted by transitioning to digital payments, and the criminal sector sought new avenues for laundering money. This case underscores the complexity of policy impacts and the adaptability of these economic sectors.

Kenya's M-Pesa System: In Kenya, the introduction of M-Pesa, a mobile money platform, has had transformative effects on the informal economy. By facilitating easier and more secure transactions, M-Pesa has enabled small businesses and individuals to engage more effectively in economic activities. However, the platform has also seen exploitation by criminal elements, who use it for money laundering and fraud. This duality illustrates the need for regulatory frameworks that can support innovation while mitigating the risks of enabling criminal activities.

Eastern European Transition Economies: The post-communist transition in Eastern Europe provides a compelling study of how rapid policy shifts and the sudden liberalization of markets can lead to a surge in informal and criminal activities. As state-controlled economies opened up, the lack of established regulatory frameworks allowed the criminal sector to flourish by capitalizing on the privatization of former state assets and the initial chaos in the financial systems. This example highlights the importance of gradual and well-structured policy measures to prevent criminal elements from embedding themselves within the emerging economic structures.

NAFTA's Impact on Mexico: The North American Free Trade Agreement (NAFTA) had significant effects on Mexico's economy, boosting the formal sector through increased trade and investment. However, it also facilitated the growth of the criminal sector, particularly drug

trafficking and human smuggling, by making cross-border movements easier. This unintended consequence of economic integration emphasizes the need for policies that are sensitive to the specific economic and social contexts of each country.

Thailand's Tourism Sector: Thailand's booming tourism sector has contributed significantly to the economy, driving growth in both formal and informal sectors. However, this influx of foreign capital has also attracted criminal activities such as scams and human trafficking. The Thai government's efforts to regulate and control these negative impacts without stifling the economic benefits of tourism reflect the complex balancing act described in our model.

These empirical examples and anecdotes reinforce the theoretical insights from our model, demonstrating the nuanced impacts of policy interventions on different sectors of the economy. They highlight the necessity for well-thought-out policies that consider the specific characteristics and vulnerabilities of each sector to effectively manage the dynamics between formal, informal, and criminal economic activities. Such targeted approaches not only mitigate the adverse effects of the criminal sector but also support the growth and integration of the informal sector into the formal economy, ultimately enhancing overall economic stability and development.

The rest of this article is organized as follows: the next section presents the literature review. Section 3 presents the model. Section 4 is devoted to a numerical analysis of the benchmark model and shows how a variation of the parameters of the model affects the endogenous variable. Sections 5 and 7 present different extensions of the model. Section 6 is devoted to empirical and anecdotal evidence supporting our theoretical model. Section 8 is the conclusion.

2. Literature Review:

Before presenting our model, we will present some papers related to this subject. The interaction between the formal, informal, and criminal sectors has been extensively studied in the literature.

Previous research has focused on various aspects such as the determinants of informality, the impact of unregulated capital, and the economics of crime. However, the role of foreign capital in these interactions has been relatively underexplored. This study aims to fill this gap by proposing a model that integrates the impact of foreign capital flows on formal, informal, and criminal activities.

Previous research has primarily focused on the determinants of informality and the impact of fiscal and regulatory policies. For example, Loayza [1996] explored the determinants of the informal sector in Latin America, highlighting the role of regulatory burdens and economic incentives. Amaral and Quintin [2006] developed a competitive model of the informal sector, emphasizing the impact of labor market regulations. Dabla-Norris et al. [2008] analyzed the causes of informality, focusing on the role of tax and regulatory policies. Becker [1968] provided a theoretical framework for understanding the economic approach to crime and punishment. Gambetta (1993) examined the business of private protection in the context of the Sicilian Mafia, illustrating the economic impact of organized crime.

More recently, Medina and Schneider [2018] have provided updated estimates of the informal economy in 158 countries, highlighting regional variations and macroeconomic determinants. Schneider [2019] explored the dimensions of the informal economy in Europe and the policies necessary for its integration into the formal economy. Additionally, ILO [2020] published recent data on the informal economy, emphasizing the importance of social protection and working conditions for informal workers, and ILO [2024] updated its database on the informal economy, providing estimates and analyses of global informality trends. Lastly, OECD [2021] examined the impact of policy measures on the informal economy during the COVID-19 pandemic, highlighting effective policy responses to support informal workers.

These studies have significantly enriched our understanding of the determinants and dynamics of informality. However, they have often neglected to integrate the dimension of foreign capital flows and their impact on the formal, informal, and criminal sectors. Our study extends these contributions by proposing a theoretical model that incorporates detection and penalization mechanisms for capital flows directed towards the informal and criminal sectors, assessing the associated risks and regulatory responses.

Our work makes a significant contribution to the literature by offering a more nuanced and integrated understanding of the dynamics between the formal, informal, and criminal sectors

under the influence of foreign capital flows. Unlike previous studies, our model examines how a small open economy receives and allocates foreign capital among these sectors, a dimension that has been largely unexplored in the literature. Furthermore, we incorporate specific mechanisms for the detection and penalization of capital flows to the informal and criminal sectors, evaluating the associated risks and regulatory responses. Our detailed numerical analysis explores the influence of various parameters and simulates different scenarios of policy interventions, providing practical recommendations for policymakers. Finally, our study proposes differentiated policies for the informal and criminal sectors, an approach that has not been sufficiently addressed in previous studies.

In summary, this study fills a significant gap in the literature by integrating foreign capital flows into the analysis of the formal, informal, and criminal sectors, and by providing policy recommendations based on rigorous numerical simulations.

3. Model

We consider a small open economy that can receive capital from abroad and in which three sectors coexist—a formal sector, an informal sector, and a criminal sector, indexed respectively by (f) , (i) and (c) . The capital received can be invested in one of the three sectors. The capital destined for the informal and criminal sectors is likely to be detected by public authorities and subject to a penalty, if applicable. In addition, the criminal sector monopolizes a fraction (τ) of the production of the two productive sectors in the form of rent. It is considered as rent-seekers.

3.1. Justification and Discussion of Hypotheses

The assumption of a small open economy is standard and helps simplify the analysis by treating global interest rates and capital availability as given [Krugman, Obstfeld, and Melitz, 2012; Obstfeld and Rogoff, 1996]. The coexistence of formal, informal, and criminal sectors reflects the real-world scenario in many economies, particularly in developing countries where informal and illegal economic activities are significant [Schneider and Enste, 2000].

Investments in the informal and criminal sectors carry higher risks due to potential detection and penalties by public authorities, justifying higher expected returns for these investments [Allingham and Sandmo, 1972; Merton, 1973]. The criminal sector's role as rent-seekers, monopolizing a fraction of the production from formal and informal sectors, aligns with the theory of predatory economic activities [Grossman and Kim, 1995; Gambetta, 1993 ; Bhagwati, 1982; Krueger 1974]⁵.

In our model, we consider the criminal sector as rent-seekers. Rent-seeking refers to activities that aim to increase the wealth of individuals or groups without contributing to overall economic productivity. This concept is well-documented in economic theory and is particularly relevant to understanding the impact of the criminal sector on the economy.

Rent-seeking behaviour is typically associated with unproductive economic activities focused on capturing existing wealth rather than creating new wealth. In the context of the criminal sector, activities such as extortion, bribery, and illegal trade can be seen as forms of rent-seeking. Criminal entities leverage their power to extract economic rents from the formal and informal sectors without contributing to overall economic productivity [Bhagwati, 1982].

The criminal sector often engages in activities that can be classified as rent-seeking. For example, organized crime groups might control and extract rents from various legitimate and illegitimate enterprises through protection rackets, corruption, and black-market operations. These activities disrupt the formal and informal economic processes, capturing a portion of the economic output without contributing to economic growth [Grossman and Kim, 1995].

Rent-seeking by the criminal sector reduces economic efficiency by diverting resources from productive uses. The efforts and resources expended in protecting property from criminal activities or complying with criminal demands represent a loss to the economy. This distortion leads to a suboptimal allocation of resources, harming overall economic welfare [Tullock, 1967].

⁵ The concept of rent-seeking behavior in economics is well-established. Rent-seeking occurs when entities seek to increase their own wealth without creating new wealth, often through manipulation of the political or legal environment. The criminal sector can be viewed as engaging in rent-seeking by extracting a fraction of the production from both the formal and informal sectors through coercion or corruption. Empirical studies have documented the impact of criminal activities on legitimate economic sectors. For instance, organized crime groups often extort businesses and individuals, effectively capturing a portion of their revenue or production. This phenomenon has been observed in various regions and contexts, indicating that the criminal sector often operates by appropriating resources from the formal and informal economies.

Empirical studies have documented how criminal organizations engage in rent-seeking behaviour, such as the Mafia's role in extorting businesses or controlling markets through illegal means. These activities create economic inefficiencies and divert resources from productive investments [Gambetta, 1993].

By considering the criminal sector as rent-seekers, our model aligns with the established economic understanding of how these activities impact economic welfare and efficiency. This perspective helps to highlight the disruptive role of the criminal sector in the broader economy and underscores the importance of addressing such activities through effective policy measures.

In our model, we deliberately exclude the usual determinants of the informal sector to focus on the specific dynamics and interactions between the formal, informal, and criminal sectors. This simplification is essential for several reasons. Firstly, it allows us to isolate and analyse the core effects of public policies, risks, and investments across these sectors without the added complexity of additional variables. Lucas [1988] emphasizes the necessity of simplifying economic models to understand the fundamental mechanisms of economic development. Secondly, the usual determinants, such as educational levels, labor market policies, and demographic characteristics, may be less relevant in the context of our study, which primarily focuses on financial aspects and investment risks. La Porta and Shleifer [2014] highlight that the importance of these factors can vary depending on the specific context of the study. Thirdly, our model's assumptions about initial conditions or institutional constraints justify the exclusion of certain specific determinants, as these assumptions render them less significant in our analysis. Schneider and Enste [2000] discuss how the significance of informal sector determinants can vary greatly depending on institutional and economic conditions. Lastly, by emphasizing the interactions between the sectors, we aim to highlight the influence of public policies and investment risks on the overall economy. This approach requires a simplified model to avoid excessive complexity and maintain analytical clarity. De Soto [1989] and Grossman and Kim [1995] provide insights into the importance of focusing on sectoral interactions to understand the broader economic dynamics.

3.2. Production

Production in the formal sector takes place according to a Cobb-Douglas function:

$$Y_f = A_f k_f^\alpha \tag{1}$$

with A_f being total factor productivity and k_f being capital.

It is assumed that a fraction denoted (τ) of the production of the formal and informal sectors is captured by the criminal sector⁶. The net output level in the formal sector is therefore:

$$y_f^n = (1 - \tau)A_f k_f^\alpha \quad (2)$$

where $\tau \in [0,1]$ is the capture rate or crime rate.

The production function for the informal sector is written:

$$Y_i = A_i k_i^\alpha \quad (3)$$

Therefore, the level of net production is:

$$y_i^n = (1 - \tau)A_i k_i^\alpha \quad (2)$$

The rent collected by the criminal sector is therefore given by:

$$Y_c = \tau Y \quad (5)$$

where $Y = Y_f + Y_i$.

In order to capture this rent, the criminal sector is supposed to use the following technology:

$$Y_c = A_c k_c^\alpha \quad (6)$$

Hence, using equations [5] and [6]:

$$\tau = \frac{A_c k_c^\alpha}{A_f k_f^\alpha + A_i k_i^\alpha} \quad (7)$$

3.3. Sources of Capital

This economy is assumed to be a small open economy. The capital available in this economy comes from national actors and foreign actors and can be invested in the formal sector, the informal sector, or the criminal sector. There is free inflow and outflow of capital for the formal

⁶ In many economic models, especially those dealing with informal and illegal economies, it is common to assume that a portion of the output is appropriated by non-productive entities. This helps to realistically capture the distortions and inefficiencies introduced by criminal activities within an economy (North, 1990 and Olson, 1993).

sector. Because the risk associated with an investment in the criminal and informal sectors is relatively higher, we assume that the return on these assets is consequently higher. The assumption of a small open economy is standard in economic analysis, as it simplifies the modelling by assuming that the economy cannot influence global prices and takes them as given [Krugman, Obstfeld, and Melitz, 2012]. The availability of capital from both national and foreign actors reflects the reality of global financial markets, where investors seek to diversify their portfolios and maximize returns by investing in various economies [Obstfeld and Rogoff, 1996].

The possibility of investing in different sectors, including the criminal sector, captures the diversity of investment opportunities and associated risks. The informal and criminal sectors often attract investments due to potentially higher returns, albeit with increased risk [Schneider and Enste, 2000]. The assumption of free capital flows in the formal sector is realistic in the context of financial globalization, where restrictions on capital movements are often lifted to attract foreign investments and stimulate economic growth [Kose et al., 2009]. The higher risk associated with investments in the informal and criminal sectors justifies the assumption of higher returns for these assets, as investors require a risk premium to compensate for the additional risks involved [Markowitz, 1952; Merton, 1973].

Foreign agents have to make the following arbitration:

- Invest in their country and obtain the return on foreign assets denoted (r^{ext}).
- Bring in their capital legally with a view to an investment in the formal sector of the domestic country whose return on assets is (r_f). The hypothesis of small open economy and free movement of capital allows us to write that the return on domestic assets (r_f) in the formal sector is given by:

$$r_f = r^{ext} \tag{8}$$

- Bring in their capital clandestinely with a view to investing in the informal sector or the criminal sector of the domestic country, the yield of which is noted as (r_i). It has a probability (ρ) of being detected by the authorities. If applicable, we note (φ)⁷ the

⁷ In the initial model, we made the assumption that if capital allocated for the informal and criminal sectors were discovered, the financial penalties imposed on these two sectors would be the same and equivalent to (φ). This is

penalty paid by the agent. Therefore, a potential foreign investor will tend to make the latter choice as long as⁸: $(1 - \rho)r_i + \rho(r^{ext} - \varphi) \geq r^{ext}$. It is indifferent when $(1 - \rho)r_i + \rho(r^{ext} - \varphi) = r^{ext}$. Therefore, the return to domestic assets in the informal sector and the criminal sector is given by: $(1 - \rho)r_i + \rho(r^{ext} - \varphi) \geq r^{ext}$

$$r_c = r_i = r^{ext} + \gamma \quad (9)$$

with $\gamma = \frac{\rho\varphi}{1-\rho}$.

A common critique that may be raised regarding our model is the notion of international investors arbitrating between formal and informal sectors. At first glance, this may seem counterintuitive, especially given that the capital needs of the informal sector are perceived as limited and can generally be met by domestic savings. However, we argue that this arbitration is plausible in certain specific economic contexts, particularly in developing economies.

First, it is important to note that international investors often seek high-return opportunities in environments characterized by strong growth, even if these involve greater risks. The informal sector, although often unregulated, can offer high returns that attract investors willing to tolerate a higher degree of uncertainty. This uncertainty is associated with the risk of detection by authorities and potential penalties. However, in economies where regulatory enforcement is weak or inconsistently applied, these risks can be perceived as manageable, which justifies the interest of investors in this sector.

Moreover, empirical examples demonstrate that the informal sector has indeed attracted foreign capital in certain areas. For instance, in the real estate and retail sectors in several developing countries, international investors have seen opportunities in the informal economy. A notable example is the mobile payment systems in Africa, such as M-Pesa, which have thrived in a

a strong assumption that we suggest softening in section 4. The informal and criminal sectors indeed have different effects on the economy. Informal activities can occasionally contribute to employment growth and local economic momentum, despite not adhering to all regulations. Conversely, criminal activities typically inflict substantial damage on the economy and society. Implementing differentiated sanctions could provide a more accurate reflection of these distinct economic impacts.

⁸ We are assuming that the volume of prospective foreign investments is substantial enough to satisfy this equation as an equality.

largely informal environment, benefiting from limited regulatory frameworks while responding to massive demand.

As for the critique that the capital needs of the informal sector are too limited to attract international investors, we emphasize that while the needs of individual informal businesses may be modest, the sector as a whole often represents a significant share of the economy in developing countries. Consequently, significant opportunities can arise in financing networks of micro-enterprises or small entrepreneurial initiatives. These are often supported by microfinance platforms or venture capital models tailored to such economic environments.

Our model also accounts for the inherent risks associated with investment in the informal sector. These risks, such as the probability of detection and associated financial penalties, are factored into the decision-making process of international investors. Nevertheless, these investors may still find these risks acceptable given the potentially higher returns the sector offers, particularly in contexts where enforcement of sanctions is lax.

Finally, it is crucial to acknowledge that local dynamics and institutional frameworks heavily influence investment decisions. In certain regions, the informal sector presents unique opportunities that are not available in more developed economies where the formal sector dominates. Therefore, investment in the informal sector often results from a complex assessment of risks and opportunities that are specific to each economic context.

3.4. Maximization of profit

The formal producer chooses the level of capital $[k_f]$ that maximizes its net profits:

$$\left\{ \begin{array}{l} \max_{k_f} y_f^n - r_f k_f \\ \text{subject to } y_f^n = (1 - \tau) A_f k_f^\alpha \end{array} \right. \quad (10)$$

First order condition involves: $r_f = \alpha(1 - \tau) A_f k_f^{\alpha-1} \Rightarrow$

$$k_f = \left(\frac{\alpha(1 - \tau) A_f}{r_f} \right)^{\frac{1}{1-\alpha}} \quad (11)$$

The informal producer program is:

$$\begin{cases} \max_{k_i} y_i^n - r_i k_i \\ \text{subject to } y_i^n = (1 - \tau)A_i k_i^\alpha \end{cases} \quad (12)$$

First order condition involves: $r_i = \alpha(1 - \tau)A_i k_i^{\alpha-1} \Rightarrow$

$$k_i = \left(\frac{\alpha(1 - \tau)A_i}{r_i} \right)^{\frac{1}{1-\alpha}} \quad (13)$$

Finally, for the criminal sector we have:

$$\begin{cases} \max_{k_c} Y_c - r_i k_c \\ \text{subject to } Y_c = A_c k_c^\alpha \end{cases} \quad (14)$$

First order condition involves: $r_i = \alpha A_c k_c^{\alpha-1} \Rightarrow$

$$k_c = \left(\frac{\alpha A_c}{r_c} \right)^{\frac{1}{1-\alpha}} \quad (15)$$

3.5. Equilibrium

In the country of destination, knowing the equilibrium conditions for the return on capital [see equations (8) and (9)] and using equations (7), (11), (13), and (15), we can solve this model by forming a system of 7 equations [7, 8, 9, 11, 13, 15] to 7 unknowns $(\tau, r_f, r_i, r_c, k_f, k_l, k_c)$.

Equations (8) and (9) give us directly r_f and r_i : $r_f = r^{ext}$ and $r_c = r_i = r^{ext} + \gamma$.

Equations (8) and (11) allow us to determine the expression of formal capital as a function of τ ,

$$k_f = [\alpha(1 - \tau)A_f / r^{ext}]^{1/(1-\alpha)} \quad (16)$$

We deduce the expression of the formal productions (Y_f) and net formal productions (y_f^n) as a function of (τ) using equations (1) and (2):

$$Y_f = A_f^{\frac{1}{1-\alpha}} \left[\frac{\alpha(1 - \tau)}{r^{ext}} \right]^{\frac{\alpha}{1-\alpha}} \quad (17)$$

$$y_f^n = [(1 - \tau)A_f]^{1-\alpha} \left[\frac{\alpha}{r^{ext}} \right]^{\frac{\alpha}{1-\alpha}} \quad (18)$$

Equations (9) and (13) allow us to determine the expression of informal capital as a function of (τ) and (γ) :

$$k_i = [\alpha(1 - \tau)A_i / (r^{ext} + \gamma)]^{1/(1-\alpha)} \quad (19)$$

We deduce the expression of the informal production (Y_i) and net informal production (y_i^n) according to $[\tau]$ and $[\gamma]$ using equations (3) and (4):

$$Y_i = A_i^{1-\alpha} \left[\frac{\alpha(1 - \tau)}{r^{ext} + \gamma} \right]^{\frac{\alpha}{1-\alpha}} \quad (20)$$

$$y_i^n = [(1 - \tau)A_i]^{1-\alpha} \left[\frac{\alpha}{r^{ext} + \gamma} \right]^{\frac{\alpha}{1-\alpha}} \quad (21)$$

Equation [9] and [15] allows us to determine the expression of criminal capital as a function of (τ) and $[\gamma]$:

$$k_c = [\alpha A_c / (r^{ext} + \gamma)]^{1/(1-\alpha)} \quad (22)$$

We deduce the expression of the criminal production as a function of (τ) and $[\gamma]$ using equation (6)

$$Y_c = A_c^{1-\alpha} \left[\frac{\alpha}{r^{ext} + \gamma} \right]^{\frac{\alpha}{1-\alpha}} \quad (23)$$

With equations (19) and (22), we can write:

$$\frac{k_i}{k_c} = \left[\frac{(1 - \tau)A_i}{A_c} \right]^{\frac{1}{1-\alpha}} \quad (24)$$

With equations (16) and (22), we can write:

$$\frac{k_f}{k_c} = \left[\frac{(1 - \tau)A_f r^{ext} + \gamma}{A_c r^{ext}} \right]^{\frac{1}{1-\alpha}} \quad (25)$$

Using equation (7) and dividing the whole equation by (Y_c) , we obtain an expression that depends only on γ and τ .

$$\tau(1 - \tau)^{\alpha/(1-\alpha)} \left[\left(\frac{A_f}{A_c} \right)^{\frac{1}{1-\alpha}} \left(\frac{r^{ext} + \gamma}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} + \left(\frac{A_i}{A_c} \right)^{\frac{1}{1-\alpha}} \right] = 1 \quad (26)$$

In view of equation (26), two remarks can be made:

1. The model does not admit a formal solution. A numerical analysis remains nevertheless possible in order to analyse the influence of the various parameters of the model. This will be the subject of the next section.
2. The model admits two solutions relative to $[\tau]$ [we will denote them $\underline{\tau}$ and $\bar{\tau}$], as shown in Figure 1.

We thus obtain a kind of Laffer curve of crime. If there is little taxation from criminal activity—that is to say, if there is little criminal activity—the income from criminal activity increases according to the predation rate. There is a time when the formal and informal sectors decrease more than the amount of the tax increases. We assume that the correct solution is $\underline{\tau}$. The same size of the criminal sector can be obtained with both a low rate and a very high rate. If we establish a very high rate, the size of the other two sectors decreases so much that we have no more gain. So, taking the smallest root means that we are on the proper side of the Laffer curve. In the rest of the paper, we will assume that $\underline{\tau}$ is the solution. We will discuss the implications of the other solution in the last section of this paper. Although the model does not admit a formal solution, a numerical analysis is possible and allows us to analyze the influence of the different parameters of the model.

4. Model parameterization, comparative statics, and optimal policy

We can therefore perform an “all other things being equal” analysis to understand how the different parameters affect the balance of the model. For this, default values are assigned to the parameters by following the literature.

- $r^{ext} = 0,04$
- $A_f = 1$
- $A_i = 0,75$
- $A_c = 0,65$
- $\alpha = 0,33$
- $\gamma = 1$

Justification of Parameter Values

- **Return on Foreign Assets** [$r^{ext} = 0,04$]: A return of 4% on foreign investments is a common assumption, based on average returns observed in international markets. This value is consistent with standard rates of return used in international macroeconomic models [Obstfeld and Rogoff, 1996].
- **Total Factor Productivity** [$A_f = 1, A_i = 0,75, A_c = 0,65$]: It is reasonable to assume that total factor productivity in the formal sector [A_f] is higher than in the informal sector [A_i], and that productivity in the informal sector is higher than in the criminal sector [A_c]. This hierarchy reflects different access to technology, infrastructure, and formal institutions [La Porta and Shleifer, 2014; De Soto, 1989].
- **Capital Share** [$\alpha = 0,33$]: A value of 0.33 for the capital share in the production function is a commonly used convention in Cobb-Douglas production functions, based on empirical estimates of the capital share in GDP [Gollin, 2002].
- **Risk Premium** [$\gamma = 1$]: The value of γ was chosen to satisfy one of the central hypotheses of the model, namely that the return on investments in the informal and criminal sectors [r_i] is higher than that in the formal sector [r_f]. Setting $\gamma = 1$ ensures that $r_f < r_i$, consistent with the idea that riskier investments require higher returns [Markowitz, 1952].

The new values introduced here are those of A_c and γ . If it is reasonable to assume that total factor productivity in the formal sector is higher than in the informal sector, it is equally reasonable to assume that it is higher in the informal sector compared to the criminal sector for the same reasons. We chose a slightly lower value for A_c . That said, the choice of this

parameter value does not have a significant impact on what follows. As for γ , a value was chosen to satisfy one of the central hypotheses of the model, namely, $r_f < r_i$.

4.1. Impact of Gamma

It is assumed that the public authorities have the possibility to increase γ without cost, which requires an increase in ρ or φ .

4.1.1. Impact of γ on τ :

Using equation (26), we can write γ as a function of τ and represent τ as a function of γ [see Figure 2]. We obtain the following equation:

$$\gamma = \left[\left(\frac{1}{\tau(1-\tau)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_f}{A_c}\right)^{\frac{1}{1-\alpha}}} - \left(\frac{A_i}{A_f}\right)^{\frac{1}{1-\alpha}} \right)^{\frac{1-\alpha}{\alpha}} - 1 \right] r^{ext} \quad (27)$$

When τ is lower than τ_l , we have a decreasing relation between τ and γ . In view of the expression of the latter, we can conclude that if we are on the right side of our Laffer curve of crime, any economic policy aimed at discouraging the illegal entry of funds into the home country will result in a drop in the crime rate. Such an economic policy would be an increase in the probability of detection or an increase in the penalty paid in the event of detection.

The nature of our equations does not allow us to express all of our endogenous variables as a function of γ , so we will express them as a function of τ in the rest of the paper. Given the inverse relationship between γ and τ . when we are on the right side of the Laffer curve of criminality, we can interpret the effect of γ on these variables accordingly.

The equations in the model involve complex interactions between multiple parameters, making it challenging to isolate all endogenous variables as functions of γ . The inverse relationship between γ and τ implies that changes in one parameter inversely affect the other. This relationship is often nonlinear and complex, making direct expression in terms of γ impractical. This complexity is common in economic models where parameters interact in nonlinear ways, as discussed in Obstfeld and Rogoff [1996] on the mathematical intricacies in international macroeconomics models.

The model exhibits a Laffer curve for criminal activity, where $\tau\tau$ represents the rate at which the criminal sector captures production from the formal and informal sectors. When analysing the right side of this curve, it becomes more intuitive and practical to interpret the model's behaviour in terms of τ . On this side, increasing $\tau\tau$ leads to diminishing returns, which is a crucial aspect for understanding the impact of policy changes or economic shifts. The concept of the Laffer curve and its implications for taxation and economic behaviour is well-documented [Laffer, 2004]. This principle can be extended to criminal activity as discussed in studies on informal economies [Schneider and Enste, 2000].

Given the practical limitations in deriving explicit solutions, numerical methods often provide a feasible approach to analyse economic models. Expressing variables in terms of $\tau\tau$ simplifies the numerical analysis and allows for more straightforward interpretation of the results. This approach aligns with common practices in economic modelling where certain variables are used as proxies for more complex relationships. Numerical methods in economic analysis are widely used to handle complex models where analytical solutions are not feasible. This approach is supported by texts such as "Numerical Methods in Economics" by Judd [1998].

By focusing on τ , the analysis can more directly address the policy implications related to criminal activity. Understanding how changes in $\tau\tau$ influence the economy provides valuable insights for designing interventions. Since $\tau\tau$ directly relates to the criminal sector's impact on the economy, it offers a clear metric for evaluating the effectiveness of policies aimed at reducing criminal activity. Policy implications of economic variables are critical for practical applications, as highlighted in studies on the economics of crime and public policy [Becker, 1968].

4.1.2. Impact of γ on criminal production [Y_c]:

Using equations [23] and [26], we obtain an expression of criminal production only as a function of τ :

$$Y_c = \left(\frac{\alpha}{r^{ext}}\right)^{\frac{\alpha}{1-\alpha}} \frac{A_c^{\frac{1}{1-\alpha}}}{\left[\left(\frac{A_c}{A_f}\right)^{\frac{1}{1-\alpha}} \frac{1}{\tau(1-\tau)^{\frac{\alpha}{1-\alpha}}} - \left(\frac{A_i}{A_f}\right)^{\frac{1}{1-\alpha}}\right]} \quad (28)$$

The effect of a rise in γ on criminal production is quite trivial and follows from what was mentioned above [see Figure 3]

4.1.3. Impact of γ on formal sector production (Y_f)

The effect of γ on formal production is given by its effect on τ . We therefore have a positive effect on formal production. Figure 4 shows the relation between Y_f and τ , using equations [17] and [18].

The formal production does not directly depend on γ . The latter's effect on formal production stems from the effect of γ on τ . Indeed, when τ is low, an external policy aimed at combating the inflow of illicit funds [via an increase in γ] is equivalent to an increase in r_i . This increase, leading to a decrease in τ , will induce an increase in formal production via the increase in capital in this sector. As criminal and informal assets become less attractive, potential investors turn to formal assets. Hence the increase in capital and production in this sector.

4.1.4. Impact of γ on informal sector production [Y_i]

By using equation [20] and [26], we get informal production and net informal production only as a function of τ represent in Figure 5:

$$Y_i = \left(\frac{\alpha}{r^{ext}}\right)^{\frac{\alpha}{1-\alpha}} \frac{(A_i)^{\frac{1}{1-\alpha}}(1-\tau)^{\frac{\alpha}{1-\alpha}}}{\left[\left(\frac{A_c}{A_f}\right)^{\frac{1}{1-\alpha}} \frac{1}{\tau(1-\tau)^{\frac{\alpha}{1-\alpha}}} - \left(\frac{A_i}{A_f}\right)^{\frac{1}{1-\alpha}}\right]} \quad (29)$$

$$y_i^n = \left(\frac{\alpha}{r^{ext}}\right)^{\frac{\alpha}{1-\alpha}} \frac{[A_i(1-\tau)]^{\frac{1}{1-\alpha}}}{\left[\left(\frac{A_c}{A_f}\right)^{\frac{1}{1-\alpha}} \frac{1}{\tau(1-\tau)^{\frac{\alpha}{1-\alpha}}} - \left(\frac{A_i}{A_f}\right)^{\frac{1}{1-\alpha}}\right]} \quad (30)$$

When τ is less than τ_i , we can see in Figure 5 that an increase in γ will result in an inverse variation in the size of the informal sector given the inverse relationship between γ and τ . The mechanism involved is not trivial. Indeed, the rise in r_i —following the rise in γ —has two opposite effects on the production of the informal sector: a negative direct effect and a positive indirect effect via τ . In the end, the direct effect outweighs the indirect effect. Indeed, on the one hand, we know that if γ increases, τ decreases if we are on the right side of the Laffer curve. The drop in τ being synonymous with a drop in the levy suffered by the informal sector, production in this sector increases. On the other hand, this rise in γ also makes the assets of the informal sector less attractive—via the rise in r_i —which translates into a drop in production in this sector.

4.1.5. Impact of γ On $GNP = Y_f + Y_i$

By using equations [17] and [29], we get GNP only as a function of τ [represented in Figure 6]:

$$PNB = \left[\frac{\alpha(1-\tau)}{r^{ext}} \right]^{\frac{\alpha}{1-\alpha}} \left[A_f^{\frac{1}{1-\alpha}} + \frac{(A_i)^{\frac{1}{1-\alpha}}}{\left[\left(\frac{A_c}{A_f} \right)^{\frac{1}{1-\alpha}} \frac{1}{\tau(1-\tau)^{\frac{\alpha}{1-\alpha}}} - \left(\frac{A_i}{A_f} \right)^{\frac{1}{1-\alpha}} \right]} \right] \quad (31)$$

By using equations [18] and [30], we get net GNP only as a function of τ :

$$PNB^{Net} = y_f^n + y_i^n = (1-\tau) \left[\frac{\alpha(1-\tau)}{r^{ext}} \right]^{\frac{\alpha}{1-\alpha}} \left[A_f^{\frac{1}{1-\alpha}} + \frac{(A_i)^{\frac{1}{1-\alpha}}}{\left[\left(\frac{A_c}{A_f} \right)^{\frac{1}{1-\alpha}} \frac{1}{\tau(1-\tau)^{\frac{\alpha}{1-\alpha}}} - \left(\frac{A_i}{A_f} \right)^{\frac{1}{1-\alpha}} \right]} \right] \quad (32)$$

Figure 6 shows us that an increase in γ which is a decrease in τ [respectively a decrease in γ which is an increase in τ] causes a decrease [an increase] in national production if we are on the right side of the Laffer curve. The rise in γ has two positive indirect effects on GNP via τ [as mentioned above] and a direct negative effect via the rise in r_i .

To sum up, our model therefore suggests that when the crime rate in a given country is initially low, governments can fight crime by putting in place measures to combat the illegal entry of foreign funds. This will lead not only to a decrease in criminal activities but also to a decrease in informality. The question that can obviously be asked at this stage is whether there is an optimal extern policy. This will be the subject of the next section.

4.2. Optimal policy

The government can control gamma and, thus, r_i too, which is link to τ . So, there is an optimal r_i an τ . The government's objective will be to find the value of γ [thus r_i] that maximizes the GNP ($Y = y_f + y_i$).

With equation [5], we can write:

$$Y = \frac{A_c k_c^\alpha}{\tau}$$

Using equations [18] and [21], we can write equation [5] only as a function of τ .

We obtain:

$$Y = \frac{A_c^{\frac{1}{1-\alpha}}}{\tau} \left(\frac{\alpha}{\gamma + r^{ext}} \right)^{\frac{\alpha}{1-\alpha}}$$

And replacing γ by its expression resulting from equation [21], we obtain an expression of GNP only as a function of τ .

$$Y = \frac{1}{\tau} \frac{(\alpha A_c)^{\frac{\alpha}{1-\alpha}} (r_f)^{\frac{-\alpha}{1-\alpha}} A_c}{\left[\left(\frac{A_c}{A_f} \right)^{\frac{1}{1-\alpha}} \frac{1}{\tau(1-\tau)^{\frac{\alpha}{1-\alpha}}} - \left(\frac{A_i}{A_f} \right)^{\frac{1}{1-\alpha}} \right]} \quad (33)$$

Maximizing this equation is equivalent to solving the following minimization program:

$$\left\{ \min_{\tau} \left(\frac{A_c}{A_f} \right)^{\frac{1}{1-\alpha}} \frac{1}{(1-\tau)^{\frac{\alpha}{1-\alpha}}} - \tau \left(\frac{A_i}{A_f} \right)^{\frac{1}{1-\alpha}} \right. \quad (34)$$

After minimization, we get:

$$\tau^* = 1 - \frac{A_c}{A_i} \left(\frac{\alpha}{1-\alpha} \right)^{1-\alpha} \quad (35)$$

We can deduce:

$$\gamma^* = \left[\left(\left(\frac{A_c}{A_f} \right)^{\frac{1}{1-\alpha}} \frac{1}{\left(1 - \frac{A_c}{A_i} \left(\frac{\alpha}{1-\alpha} \right)^{1-\alpha} \right) \left(\frac{A_c}{A_i} \left(\frac{\alpha}{1-\alpha} \right)^{\frac{\alpha}{1-\alpha}} \right)} - \left(\frac{A_i}{A_f} \right)^{\frac{1}{1-\alpha}} \right)^{\frac{1-\alpha}{\alpha}} - 1 \right] r_f \quad (36)$$

By choosing this level of γ , the government can maximize GNP. Figure 6 shows us the values of τ^* and γ^* , which are respectively evaluated at 0.21 and 0.29. That said, it should be noted that this is a second-best policy. It can be compared to a first-best policy.

4.3. First-best policy

The existence of a first-best situation is conditioned by the absence of the criminal sector in the economy. This economy being assumed to be a small open economy, there is an external formal interest rate and an informal interest rate. If we can make a distinction between the informal

interest rate and the criminal interest rate, it would be in our interest to take the latter equal to plus infinity. This results in the absence of the criminal sector in the model.

We have $r_f, r_c \rightarrow +\infty, r_i = r_f + \gamma$.

In this case, $GNB = A_f k_f^\alpha + A_i k_i^\alpha$, knowing that $k_f = \left(\frac{\alpha A_f}{r_f}\right)^{\frac{1}{1-\alpha}}$ and $k_i = \left(\frac{\alpha A_i}{r_i}\right)^{\frac{1}{1-\alpha}}$.

To maximize the GNP, it is therefore in our interest to have the r_i as small as possible. This is equivalent to choose $\gamma = 0$ and therefore $r_i = r_f$. This corresponds to a first-best policy. This policy can be compared to the second-best policy mentioned in the previous section with the help of Figure 7.

If γ tends to infinity, there would be neither a criminal sector nor an informal sector, so the GNP will correspond only to formal production. Before reaching this point, there is the γ^* which corresponds to the second-best policy. The GNP reached at this point is lower than the first-best GNP, which corresponds to the exclusion of the criminal sector. We therefore conclude that the existence of the criminal sector prevents the economy from reaching the level of development that it would have had in its absence. In the absence of a criminal sector, the government chooses not to fight against the entry of illicit funds that will feed the informal sector, hence the rise in GNP. Conversely, in the presence of the criminal sector, if we increase the fight against the criminal sector, this will have two effects on GNP: a positive effect [this reduces formal production less] and a negative effect [linked to the reduction of informal production]. There is therefore a trade-off to be made between the positive effect of this policy on the formal sector and its negative effect on the informal sector. This leads the government to seek an optimal control rate.

5. Extension of the model

We have just seen the arbitration that the government must make. What happens to this arbitration:

- when the informal and formal sectors are not taxed at the same rate by the criminal sector?
- when the financial sanctions suffered by the informal sector and the criminal sector differ in the event of detection by public authorities?

5.1. Extension 1: What happens to the government's arbitration when the formal and informal sector are not taxed at the same rate by criminal sector?

To answer this question, we will introduce a new variable denoted (θ). Indeed, we assume that the informal sector is taxed at the rate (τ) and the formal sector at the rate ($\theta\tau$). We can thus analyze different scenarios.

At equilibrium, equations [16], [20], and [21] are respectively amended as follows:

$$k_f = [\alpha(1 - \theta\tau)A_f/r^{ext}]^{1/(1-\alpha)} \quad (37)$$

We can deduce:

$$Y_f = A_f^{\frac{1}{1-\alpha}} \left[\frac{\alpha(1 - \theta\tau)}{r^{ext}} \right]^{\frac{\alpha}{1-\alpha}} \quad (38)$$

$$\frac{k_f}{k_c} = \left[\frac{(1 - \theta\tau)A_f r^{ext} + \gamma}{A_c r^{ext}} \right]^{\frac{1}{1-\alpha}} \quad (39)$$

$$\tau \left[\theta(1 - \theta\tau)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_f}{A_c} \right)^{\frac{1}{1-\alpha}} \left(\frac{r^{ext} + \gamma}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} + (1 - \tau)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_i}{A_c} \right)^{\frac{1}{1-\alpha}} \right] = 1 \quad (40)$$

In order to analyse the consequences of this new configuration, we will review three scenarios.

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$$\frac{k_f}{k_c} = \left[\frac{(1-\theta\tau)A_f r^{ext} + \gamma}{A_c r^{ext}} \right]^{\frac{1}{1-\alpha}} \quad (39)$$

$$\tau \left[\theta(1-\theta\tau)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_f}{A_c} \right)^{\frac{1}{1-\alpha}} \left(\frac{r^{ext} + \gamma}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} + (1-\tau)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_i}{A_c} \right)^{\frac{1}{1-\alpha}} \right] = 1 \quad (40)$$

In order to analyse the consequences of this new configuration, we will review three scenarios.

5.1.1. Case 1: $\theta = 1$

When $\theta = 1$, it means that the informal sector and the criminal sector are taxed at the same rate. We thus find the benchmark model.

5.1.2. Case 2: $\theta = \frac{1}{2}$

- Formal production:

If the formal sector is taxed half as much as than the informal sector, we obtain the following level of formal production:

$$Y_f = A_f^{\frac{1}{1-\alpha}} \left[\frac{\alpha \left(1 - \frac{1}{2}\tau\right)}{r^{ext}} \right]^{\frac{\alpha}{1-\alpha}} \quad (41)$$

- Informal production:

$$Y_i = A_i^{\frac{1}{1-\alpha}} \left(\frac{\alpha}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} \frac{\frac{1}{2}\tau \left(1 - \frac{1}{2}\tau\right)^{\frac{\alpha}{1-\alpha}}}{\left[1 - \tau(1-\tau)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_i}{A_c} \right)^{\frac{1}{1-\alpha}} \right]} \quad (42)$$

- Criminal production:

$$Y_c = A_i^{\frac{1}{1-\alpha}} \left(\frac{\alpha}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} \frac{(1-\tau)^{\frac{\alpha}{1-\alpha}} \frac{1}{2} \tau \left(1 - \frac{1}{2} \tau\right)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_f}{A_c}\right)^{\frac{1}{1-\alpha}}}{\left[1 - \tau(1-\tau)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_i}{A_c}\right)^{\frac{1}{1-\alpha}}\right]} \quad (43)$$

- PNB:

$$PNB = Y_f + Y_i = A_f^{\frac{1}{1-\alpha}} \left(\frac{\alpha \left(1 - \frac{1}{2} \tau\right)}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} \left[1 + \frac{\frac{1}{2} \tau (1-\tau)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_i}{A_c}\right)^{\frac{1}{1-\alpha}}}{1 - \tau(1-\tau)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_i}{A_c}\right)^{\frac{1}{1-\alpha}}} \right] \quad (44)$$

If $0 < \theta < 1$ in other words, if the formal sector is relatively less taxed than the criminal sector, the maximization of GNP has several consequences. We notice that the closer θ gets to 0, the more the values of γ and τ , which maximize the GNP, tend to increase.

The consequence of this result is a tendency toward:

- an increase in maximum formal output
- a decline in maximum informal production
- a decrease in maximum criminal production
- a decrease in maximum GNP

Indeed, the upward trend in formal production cannot compensate for the downward trend in informal production. This is a consequence of the diminishing nature of returns to scale. We also note that to maximize the GNP, the government is encouraged to increase the fight against the criminal sector when the formal sector is less exposed.

5.1.3. Case 3: $\theta = 0$

When $\theta = 0$ it means that the formal sector is not taxed. Only the informal sector is taxed by the criminal sector. The equations [26], [27], and [28] are modified as follows:

$$k_f = [\alpha A_f / r^{ext}]^{1/(1-\alpha)} \quad (45)$$

$$\frac{k_f}{k_c} = \left[\frac{A_f r^{ext} + \gamma}{A_c r^{ext}} \right]^{\frac{1}{1-\alpha}} \quad (46)$$

$$\tau(1-\tau)^{\frac{1}{1-\alpha}} \left(\frac{A_i}{A_c} \right)^{\frac{1}{1-\alpha}} = 1 \quad (47)$$

In terms of implications, the equation [31] no longer depends on γ , since the criminal and informal sectors have the same yield. We obtain a higher tax rate [compared to the case where $\theta = 1$], which no longer depends on γ . When we increase γ , we do not decrease the crime rate (τ) [its effects on the informal and criminal sectors neutralize each other]. On the other hand, we decrease the income of the informal sector. In the end, the quantity levied decreases but not the rate.

- Formal production:

$$Y_f = A_f^{\frac{1}{1-\alpha}} \left[\frac{\alpha}{r^{ext}} \right]^{\frac{\alpha}{1-\alpha}} \quad (48)$$

- Informal production:

$$Y_i = A_i^{\frac{1}{1-\alpha}} \left(\frac{\alpha(1-\tau)}{r^{ext} + \gamma} \right)^{\frac{\alpha}{1-\alpha}} \quad (49)$$

- Criminal production:

$$Y_c = A_c^{\frac{1}{1-\alpha}} \left(\frac{\alpha}{r^{ext} + \gamma} \right)^{\frac{\alpha}{1-\alpha}} \quad (50)$$

- GNP:

$$\text{GNP} = Y_f + Y_i = A_f^{\frac{1}{1-\alpha}} \left[\frac{\alpha}{r^{ext}} \right]^{\frac{\alpha}{1-\alpha}} + A_i^{\frac{1}{1-\alpha}} \left(\frac{\alpha(1-\tau)}{r^{ext} + \gamma} \right)^{\frac{\alpha}{1-\alpha}} \quad (51)$$

Thus, to maximize the GNP, the government has no choice but to not fight against investment in illicit activities, that is, to choose $\gamma \rightarrow 0$.

- probability of detection by public authorities?

5.2. What happens to the government's arbitration when the financial sanctions suffered by the informal sector and the criminal sector differ in the event of detection by public authorities?

In the basic model, it was assumed that if funds intended for the informal and criminal sectors were detected, the financial sanctions on these two sectors would be identical and equal to $[\varphi]$. This is a strong assumption that we propose to relax in this section. Indeed, the informal and criminal sectors do not have the same impact on the economy. Informal activity can sometimes contribute to job creation and local economic dynamics, even if it does not comply with all regulations. On the other hand, criminal activities generally cause significant harm to the economy and society. Differentiating sanctions would allow for better consideration of these distinct economic impacts. It may be unfair to apply the same penalty to a merchant who does not declare part of their income and to a drug trafficker.

By relaxing this assumption, we want to find out what happens to the government's arbitration. For this, we denote $[\varphi_i]$ as the financial penalty applied to the informal sector and $[\varphi_c]$ as the financial penalty applied to the criminal sector, with $\varphi_i < \varphi_c$. The immediate consequence of this assumption is that the rates of return on informal and criminal activities differ, denoted as $r_i < r_c$. Since investing in a criminal activity is relatively riskier, the expected return is relatively greater. Thus, under the assumptions of the model, equation (9) is modified as follows:

- the return to domestic assets in the informal sector is given by: $(1 - \rho)r_i + \rho(r^{ext} - \varphi_i) \geq r^{ext}$

$$r_i = r^{ext} + \gamma_i \quad (52)$$

$$\text{with } \gamma_i = \frac{\rho\varphi_i}{1-\rho}.$$

- The return to domestic assets in the criminal sector is given by: $(1 - \rho)r_c + \rho(r^{ext} - \varphi_c) \geq r^{ext}$

$$r_c = r^{ext} + \gamma_c \quad (53)$$

$$\text{with } \gamma_c = \frac{\rho\varphi_c}{1-\rho}.$$

Indeed, the assumption of equal financial sanctions between the informal and criminal sectors provides a simple and coherent analytical framework, but it must be confronted with the complex and diverse reality of these two sectors. A more nuanced approach, taking into account the severity of offenses, the economic impact, and the specific context, may prove more effective in deterring illegal behaviours and promoting a formal and regulated economy. This approach allows for more targeted and appropriate responses to the unique challenges posed by each sector, potentially leading to better outcomes in terms of compliance and overall economic health.

Under this new assumption, at equilibrium, equation [26] is amended as follows:

$$\tau(1 - \tau)^{\frac{\alpha}{1-\alpha}}(r^{ext} + \gamma_c)^{\frac{\alpha}{1-\alpha}} \left[\left(\frac{A_f}{A_c}\right)^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext}}\right)^{\frac{\alpha}{1-\alpha}} + \left(\frac{1}{r^{ext} + \gamma_i}\right)^{\frac{\alpha}{1-\alpha}} \left(\frac{A_i}{A_c}\right)^{\frac{1}{1-\alpha}} \right] = 1 \quad (54)$$

Like in the benchmark model, in view of equation (54), the model does not admit a formal solution. A numerical analysis remains nevertheless possible in order to analyse the influence of the various parameters of the model. The model admits two solutions relative to $[\tau]$ [we will denote them $\underline{\tau}$ and $\bar{\tau}$], as shown in Figure 13.

We can therefore perform an “all other things being equal” analysis to understand how the different parameters affect the balance of the model. For this, default values are assigned to the parameters by following the literature.

$$r^{ext} = 0,04; A_f = 1; A_i = 0,75; A_c = 0,65; \alpha = 0,33; \gamma_i = 1.$$

It is assumed that the public authorities have the possibility to increase γ_c without cost, which requires an increase in ρ or φ_c .

5.2.1. Impact of γ_c on τ :

Using equation (54), we can write γ_c as a function of τ and represent γ_c as a function of τ [see Figure 14]. We obtain the following equation:

$$\gamma_c = \frac{A_c^{\frac{1}{\alpha}}}{\tau^{\frac{1-\alpha}{\alpha}} [1 - \tau] \left[A_f^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext}}\right)^{\frac{\alpha}{1-\alpha}} + A_i^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext} + \gamma_i}\right)^{\frac{\alpha}{1-\alpha}} \right]^{\frac{1-\alpha}{\alpha}}} - r^{ext} \quad (55)$$

When τ is lower than τ_l , we have a decreasing relation between τ and γ_c . In view of the expression of the latter, we can conclude that if we are on the right side of our Laffer curve of crime, any economic policy aimed at discouraging the illegal entry of funds into the home will result in a drop in the crime rate. Such an economic policy would be an increase in the probability of detection or an increase in the penalty paid in the event of detection.

The nature of our equations does not allow us to express all of our endogenous variables as a function of γ_c , so we will express them as a function of τ in the rest of the paper. Given the inverse relationship between γ_c and τ . when we are on the right side of the Laffer curve of criminality, we can interpret the effect of γ_c on these variables accordingly.

5.2.2. Impact of γ_c on criminal production Y_c :

Under the new assumptions, equation [28] is amended as follows:

$$Y_c = \tau[\alpha(1 - \tau)]^{\frac{\alpha}{1-\alpha}} \left[(A_f)^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} + (A_i)^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext} + \gamma_i} \right)^{\frac{\alpha}{1-\alpha}} \right] \quad (56)$$

The effect of a rise in γ_c on criminal production is quite trivial and follows from what was mentioned above (Figure 15).

5.2.3. Impact of γ_c on formal sector production Y_f :

The effect of γ_c on formal production is given by its effect on τ . We therefore have a positive effect on formal production. Figure 4 show the relation between Y_f and τ , using equation (17) and (18). The effect is identical to that of the benchmark model (figure 4).

The formal production does not directly depend on γ_c . The latter's effect on formal production stems from the effect of γ_c on τ . Indeed, when τ is low, an external policy aimed at combating the inflow of illicit funds [via an increase in γ_c] is equivalent to an increase in r_c . This increase, leading to a decrease in τ , will induce an increase in formal production via the increase in capital in this sector. As criminal and informal assets become less attractive, potential investors turn to formal assets. Hence the increase in capital and production in this sector.

5.2.4. Impact of γ_c on informal sector production Y_i :

Under the new assumptions, equation [29] is amended as follows:

$$Y_i = A_i^{\frac{1}{1-\alpha}} \left[\frac{\alpha(1-\tau)}{r^{ext} + \gamma_i} \right]^{\frac{\alpha}{1-\alpha}} \quad [57]$$

When τ is less than τ_l , we can see in Figure 15 that an increase in γ_c will result in an inverse variation in the size of the informal sector given the inverse relationship between γ_c and τ .

An increase in the financial penalty suffered by the criminal sector upon detection of funds destined for this sector [an increase in γ_c] will result in a corresponding decrease in the predation rate of the criminal sector on the two productive sectors of the economy [formal and informal sectors]. This decrease will lead to an increase in both formal and informal productions. Regarding the effect on the informal sector, and contrary to the results of the basic model, it is observed that when the government specifically targets criminal activities, the ambiguous effect of the policy to combat the entry of funds destined for the criminal sector on formal activities is no longer present.

This outcome suggests that by more effectively curbing criminal activities through targeted financial penalties, the government can reduce the harmful impact these activities have on other sectors. As a result, both formal and informal sectors may experience growth due to a decrease in criminal interference and lower risks associated with illegal economic activities. This targeted approach not only addresses the criminal activities more directly but also alleviates the unintended negative consequences on the formal economic activities that a less differentiated sanction policy might impose.

5.2.5. Impact of γ_c on $GNP = Y_f + Y_i$

Under the new assumptions, equation (30) is amended as follows:

$$GNP = [\alpha(1-\tau)]^{\frac{\alpha}{1-\alpha}} c \left[(A_f)^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} + (A_i)^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext} + \gamma_i} \right)^{\frac{\alpha}{1-\alpha}} \right] \quad [58]$$

Figure 16 shows us that an increase in γ_c which is a decrease in τ [respectively a decrease in γ_c which is an increase in τ] causes a decrease [an increase] in national production if we are on the right side of the Laffer curve. The rise in γ_c has two positive indirect effects on GNP via τ [as mentioned above].

and a direct negative effect via the rise in r_i .

To sum up, our model therefore suggests that when the crime rate in a given country is initially low, governments can fight crime by putting in place measures to combat the illegal entry of foreign funds. This will lead to a decrease in criminal activities only when the instruments used target only criminal activities. On the other hand, when the government targets informal activities [via an increase in γ_i], this will lead to not only a decrease in informality but also a decrease in criminal activities. The question that can obviously be asked at this stage is whether there is an optimal extern policy in this context. This will be the subject of the next section.

Regarding the effect of γ_i on the different variables of the model, it remains identical to that of the benchmark model.

5.2.6. Optimal policy

The government can control γ_c and, thus, r_c too, which is link to τ . So, there is an optimal r_c an τ . The government's objective will be to find the value of γ_c [thus r_c] that maximizes the GNP ($Y = y_f + y_i$).

$$GNP(Y = y_f + y_i) = [\alpha(1 - \tau)]^{\frac{\alpha}{1-\alpha}} \left[(A_f)^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} + (A_i)^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext} + \gamma_i} \right)^{\frac{\alpha}{1-\alpha}} \right]$$

Given the expression for GNP and considering that τ ranges from 0 to 1, we can directly conclude that GNP reaches its maximum when τ approaches 0. Considering the expression of γ_c as a function of τ , τ tends towards 0 if and only if γ_c tends towards infinity. In conclusion, when the government wishes to maximize production in the two productive sectors of the economy [formal and informal sectors], it is in their interest to choose γ_c as high as possible. In other words, to implement policies that specifically target criminal activities.

$$\tau^* = 0 \text{ when } \gamma_c \rightarrow \infty.$$

$$GNP^* = [\alpha]^{\frac{\alpha}{1-\alpha}} \left[(A_f)^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext}} \right)^{\frac{\alpha}{1-\alpha}} + (A_i)^{\frac{1}{1-\alpha}} \left(\frac{1}{r^{ext} + \gamma_i} \right)^{\frac{\alpha}{1-\alpha}} \right] \quad [59]$$

By choosing this level of γ_c , the government can maximize GNP. Figure 6 shows us the values of τ^* and γ_c^* , which are respectively evaluated at 0 and infinity.

The government has another tool at its disposal to combat criminal activities through the close link between criminal and informal activities. Indeed, by specifically targeting informal

activities [via an increase in γ_i this time], the production of the informal sector decreases, and thus the predation base of the criminal sector also decreases, leading to a reduction in criminality rent-seeking. This measure results in a decrease in GNP and leads the government to make the same trade-off as in the benchmark model. It is observed that the optimal GNP tends to increase when the financial penalty on criminal activities is greater than that on informal activities. To demonstrate this, the following approach was taken: it was assumed that $\gamma_i = a\gamma_c$ with $a \in [0,1]$.

In conclusion, this section offers a profound insight into the dynamic interplay between government arbitration and financial penalties in the informal and criminal sectors. By relaxing the assumption of uniform financial sanctions across these sectors, this section presents a differentiated approach that accounts for the unique economic impacts and risks associated with each sector.

This refined model highlights the effectiveness of tailoring financial penalties—where penalties for the criminal sector [γ_c] are greater than those for the informal sector [γ_i —in reducing the negative spillovers on the economy while enhancing compliance and economic health. It elucidates how an increase in the penalty for the criminal sector [γ_c] directly correlates with a reduction in criminal activities' predation on productive sectors, leading to increased outputs in both formal and informal sectors. This strategy not only curbs the criminal influence but also stimulates legitimate economic activities, contributing positively to the Gross National Product [GNP].

Furthermore, the analysis demonstrates the nuanced effects of these differentiated sanctions on the rates of return in both sectors, where higher risks associated with criminal activities necessitate higher returns. The mathematical treatment, including modifications to key equations and numerical analysis, lays out a clear framework for understanding the impacts of these policy adjustments.

The implications of this research are significant for policymakers. It suggests that by strategically increasing sanctions in the criminal sector relative to the informal sector, governments can effectively decrease overall criminality without stifling the potential economic benefits of the informal sector. This approach not only aids in optimizing national production but also in achieving a more balanced and equitable economic policy framework.

Ultimately, this section provides a compelling case for the adoption of a more differentiated and context-sensitive policy approach in managing the complex realities of informal and criminal economic activities. By doing so, it offers a pathway towards a more regulated, productive, and harmonious economic environment.

6. From theory to reality: Empirical and anecdotal evidence supporting our theoretical model

Our research findings align closely with a variety of empirical and anecdotal evidence from diverse economic contexts, shedding light on the intricate dynamics between the formal, informal, and criminal sectors in response to foreign capital inflows. Here, we integrate these findings with real-world examples to underscore their practical implications and reinforce the model's relevance.

6.1. Reduction of the criminal Sector through enhanced penalties and detection:

Our theoretical model concludes that stringent penalties and detection mechanisms can significantly reduce the criminal sector. This conclusion is corroborated by India's 2016 demonetization initiative⁹. Although primarily aimed at the informal sector, it also disrupted black money flows, affecting the criminal sector. However, this initiative highlighted the rapid adaptability of criminal elements, underscoring the need for sustained and well-structured regulatory measures rather than abrupt financial shocks. Brookings Institution (2017), Chodorow-Reich et al. (2019), Chacko (2018) provide an in-depth analysis of the demonetization initiative in India, highlighting its impacts on the informal sector, black money flows, and the digital economy. These studies support the assertion that stringent measures can

⁹ The 2016 demonetization in India, which aimed at curbing black money by removing high-denomination notes from circulation, significantly disrupted the informal economy and affected the criminal activities that rely on cash. This policy reduced the currency in circulation by 75% overnight, leading to a sharp decline in economic activities that rely heavily on cash transactions. The effects varied across different regions, with some experiencing more severe economic disruptions than others (Chodorow-Reich et al. 2019). This variation provides a nuanced understanding of how such policies can impact different sectors of the economy differently.

disrupt criminal activities while emphasizing the need for thoughtful implementation and accompanying measures to mitigate economic disruptions.

6.2. Balancing regulation of informal economic activities:

Our model emphasizes the need to balance fostering the formal sector and allowing the informal sector to thrive without excessive formalization. This is illustrated by the introduction of mobile money platforms like M-Pesa in Kenya, which provided financial services to the previously unbanked, boosting the informal economy while also opening new avenues for fraud, underscoring the need for constant vigilance against criminal exploitation¹⁰. Research on post-communist transitions in Eastern Europe by JETIR (2018) reinforces the argument that an equilibrium must be found between supporting the formal sector and maintaining the vitality of the informal sector. It warns against rapid, unsupported reforms that can inadvertently create fertile ground for criminal activities.

6.3. Differentiating between informal and criminal sectors in policy implementation:

Our findings support differentiated policies for the informal and criminal sectors. This approach is echoed by the nuanced impacts observed under NAFTA in Mexico, where economic integration boosted the formal economy but also increased criminal activities due to easier cross-border smuggling. Effective policies should promote economic integration and growth while specifically targeting and mitigating potential criminal exploitation.

Studies on NAFTA in Mexico illustrate how increased economic integration has facilitated cross-border smuggling and criminal activities. Despite the economic benefits, NAFTA has inadvertently supported drug trafficking organizations (DTOs) by increasing the flow of goods and people across the border, thereby exacerbating violence and drug trade (COHA, 2023; FBI, 2023). Similarly, the tourism sector in Thailand, although significantly benefiting from foreign investment and tourism, has attracted criminal elements. A targeted approach that protects the tourism-driven informal economy while cracking down on criminal activities could maximize positive outcomes.

¹⁰ See Aron, J. (2018), Mbiti, I., and Weil, D. N. (2014) for more detail on M-Pesa.

Studies on NAFTA in Mexico¹¹ and the tourism sector in Thailand¹² illustrate how economic integration and growth can be accompanied by increased criminal activities. They highlight the need for targeted policies that encourage economic growth while preventing and repressing criminal exploitation.

7. Wrong side of the Laffer curve of crime $\bar{\tau}$

We will conclude by mentioning the unrealistic scenario where we are on the wrong side of the Laffer curve $\bar{\tau}$. This corresponds to the case where there would be such crime that lowering the crime rate would increase the income from criminal activity. In this case, $\bar{\tau}$ and r_i move in the same direction. When we fight against criminal activities, we increase the levy rate of the criminal sector, which will induce a decline in formal activity. Even though it may seem counterintuitive, some empirical and anecdotal evidence can shed light on this assertion.

Displacement effect: When authorities strengthen security or legislation in a specific region, criminal activities may not disappear but simply move to less monitored regions. This phenomenon is well-documented in studies on urban crime and can indirectly increase crime rates in the newly targeted areas¹³.

Effects of repression on illegal markets: In the illegal drug markets, for example, intensifying repressive measures can increase the prices of these products due to the increased risk. This price hike can encourage more people to enter the illegal market to take advantage of these higher margins, thereby increasing criminality. Moreover, increased repression can lead to more violent forms of crime, as the markets become more competitive and secretive¹⁴.

¹¹ Hidalgo, E. et al (2022) and Staudt, K. (2018) offer further insights into the specific ways in which NAFTA has inadvertently aided criminal organizations in Mexico.

¹² Suksonghong, K., Goh, K.-L. (2023) and Mawby, R.I., Vakhitova, Z.I. (2022) may provide additional details on how the tourism sector in Thailand has been affected by criminal exploitation.

¹³ See Brantingham, P.L., & Brantingham, P.J. (1995) for more details.

¹⁴ See Miron, J. A. (2003) for more details.

Criminalization of previously legal behaviours: The introduction of new laws that criminalize certain behaviours or activities can artificially raise crime statistics. For instance, some drug legislation has transformed what was once relatively unregulated consumption into a wide range of criminal offenses¹⁵.

Economic impact of criminalization: Formal activities can suffer when resources are shifted towards fighting crime or when businesses and consumers feel less secure. Investments may decline in areas perceived as unstable or risky, which affects employment and economic growth¹⁶.

Anecdotes of crime-fighting policies: There are various historical and contemporary cases where crime-fighting policies have had paradoxical effects. For example, the Prohibition in the United States during the 1920s not only increased gang activity but also hindered the legal operation of bars and distilleries, thus harming the formal economy¹⁷.

These examples show that although the intention behind increasing crime-fighting efforts is often to secure and improve society, the effects can be complex and sometimes contrary to the goals sought. The implementation of such measures requires a thorough analysis of the underlying causes of crime and the socio-economic impact of policies to avoid unintended consequences.

8. Conclusion

The findings of this study offer significant insights into the complex interplay between the formal, informal, and criminal sectors in economies influenced by foreign capital. Our model demonstrates that while stringent detection and penalty mechanisms can significantly curb criminal activities, they also promote growth within the formal sector. However, it is crucial to maintain a balance in the regulation of the informal sector to avoid stifling its economic

¹⁵ See Friedman M. (1972) for more details.

¹⁶ See Thorsten, B., et al. (2005) for more details.

¹⁷ See Asbury, H. (1928) for more details.

contributions. The integration of empirical and anecdotal evidence from countries like India, Thailand, and Kenya underscores the relevance of our theoretical findings and highlights the practical challenges of implementing policy measures.

Our research suggests that the most effective policies are those that clearly differentiate between informal and criminal activities, applying rigorous controls to the latter while fostering the former through supportive measures and less restrictive regulations. By adopting such targeted strategies, governments can enhance the positive impacts of foreign capital, supporting legitimate economic growth and reducing the adverse effects of criminal enterprises.

This study contributes to the broader discourse on economic policy by providing a nuanced understanding of sectoral interactions in the face of foreign capital inflows. It offers a pathway for policymakers to optimize national economic outputs while mitigating the risks associated with these inflows, paving the way for more regulated, productive, and equitable economic environments.

Figure 1: Solution of the model

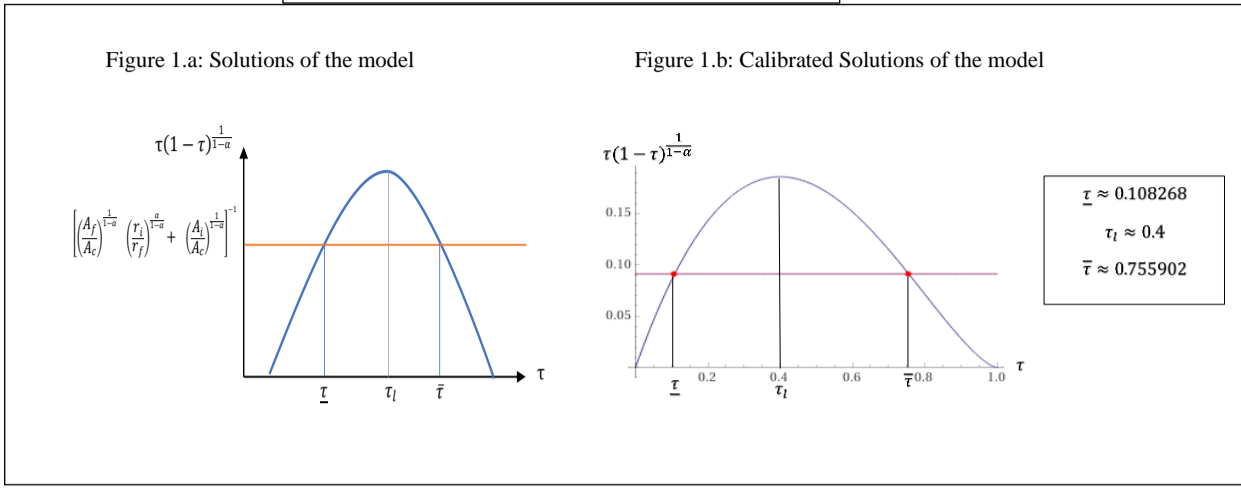


Figure 2: Relation between γ and τ

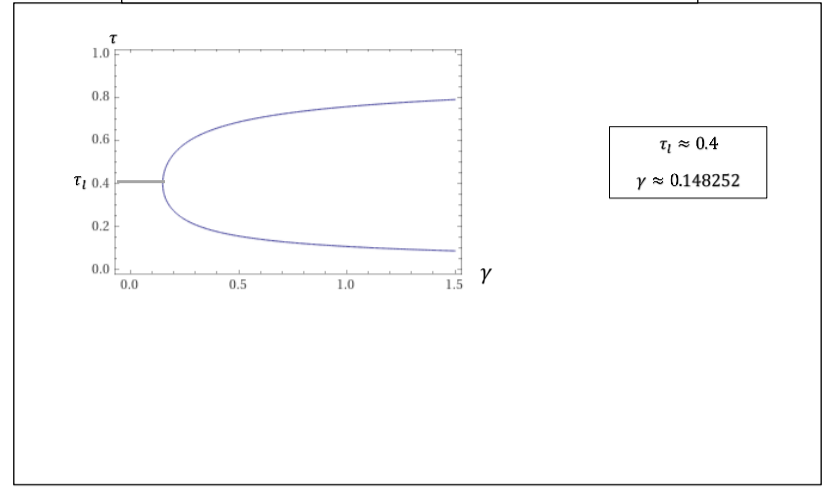


Figure 3: Relation between Y_c and τ

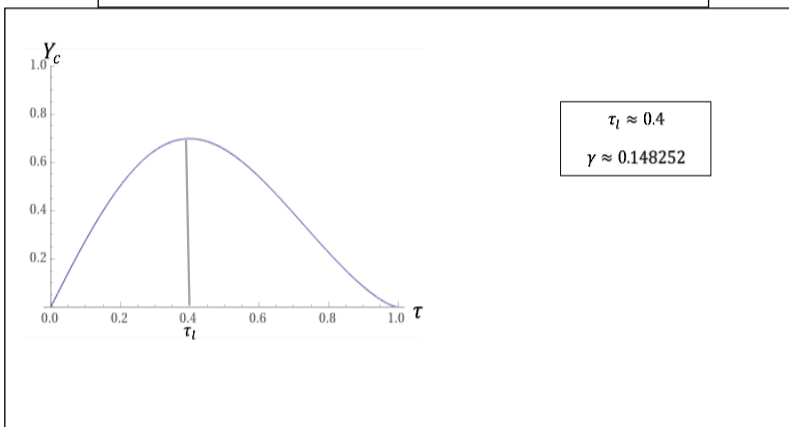


Figure 4: Relation between Y_f and τ

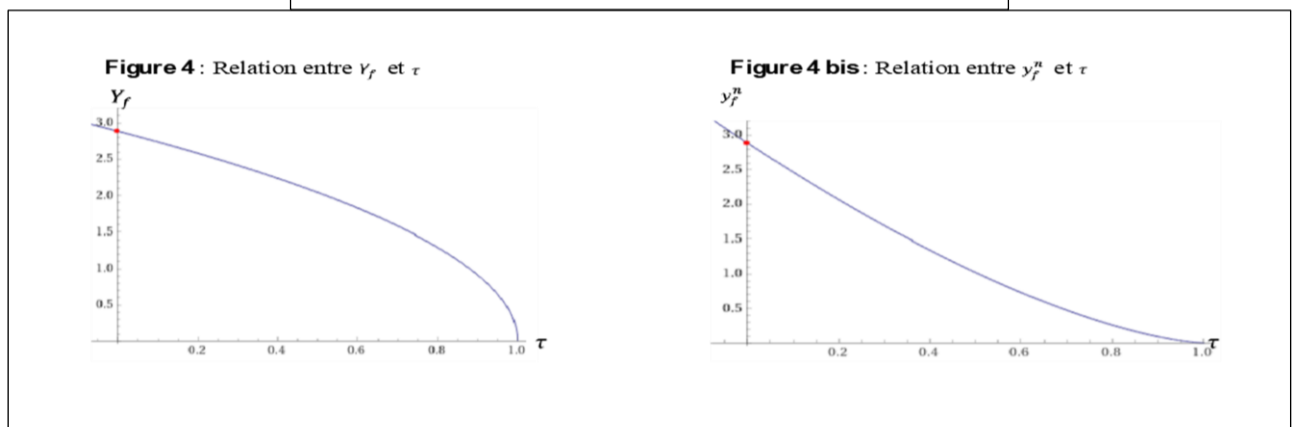


Figure 5: Relation between Y_i and τ

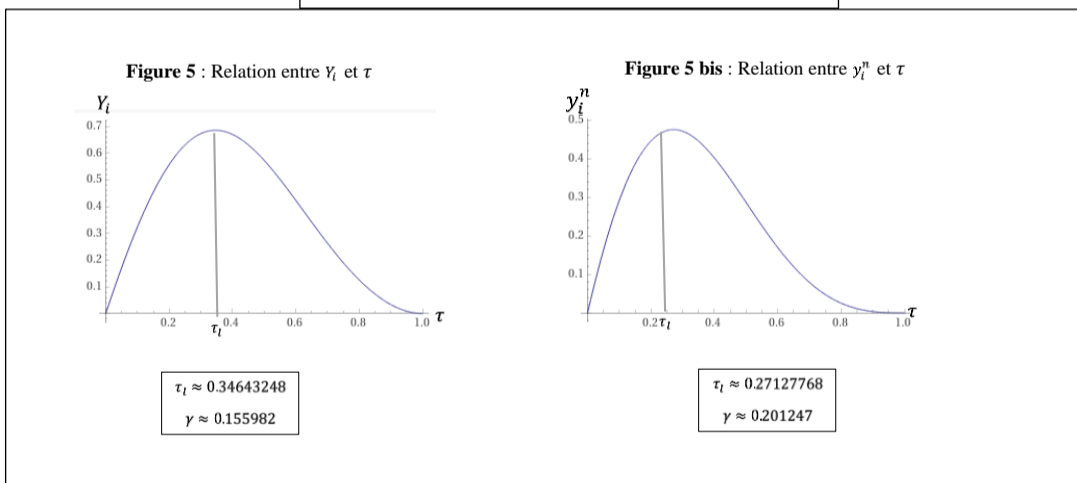


Figure 6: Relation between $(PNB = Y_f + Y_i)$ and τ

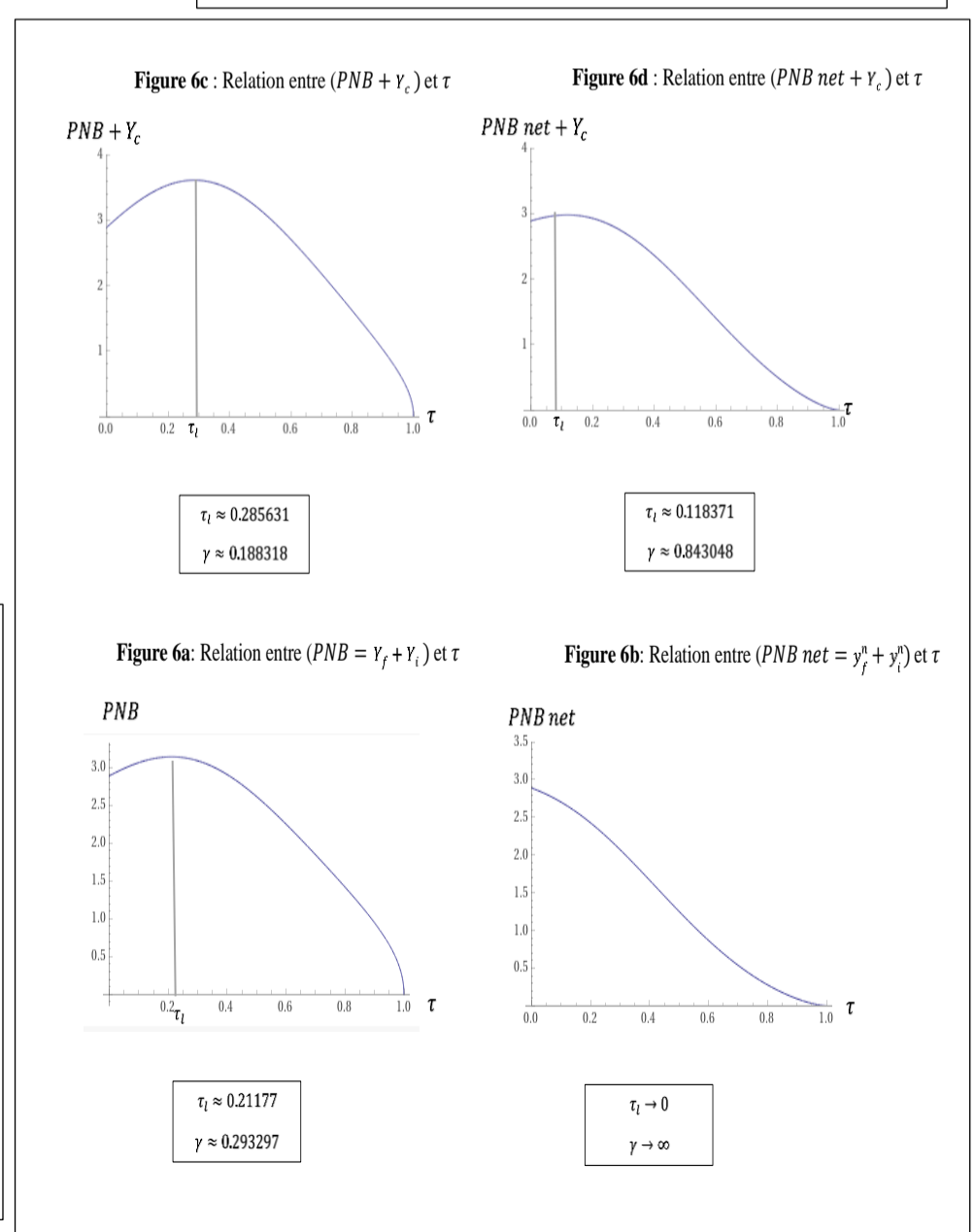


Figure 7: Maximization of $(GNB = Y_f + Y_i)$: 1st best and 2nd best

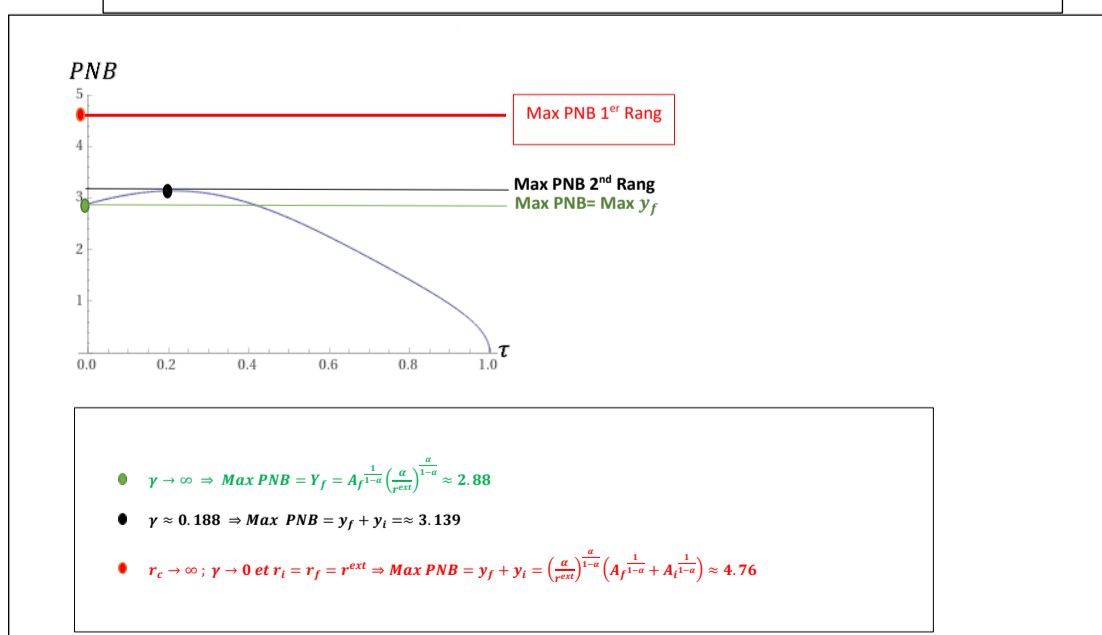


Figure 8: Calibrated solution of the model in τ if $\theta = \frac{1}{2}$

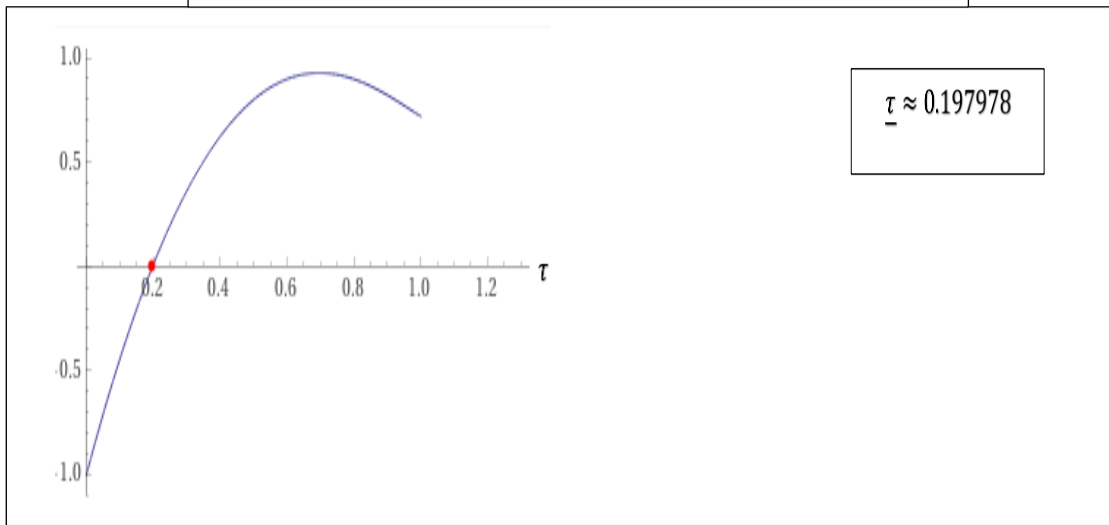


Figure 9: Relation between γ and τ if $\theta = \frac{1}{2}$

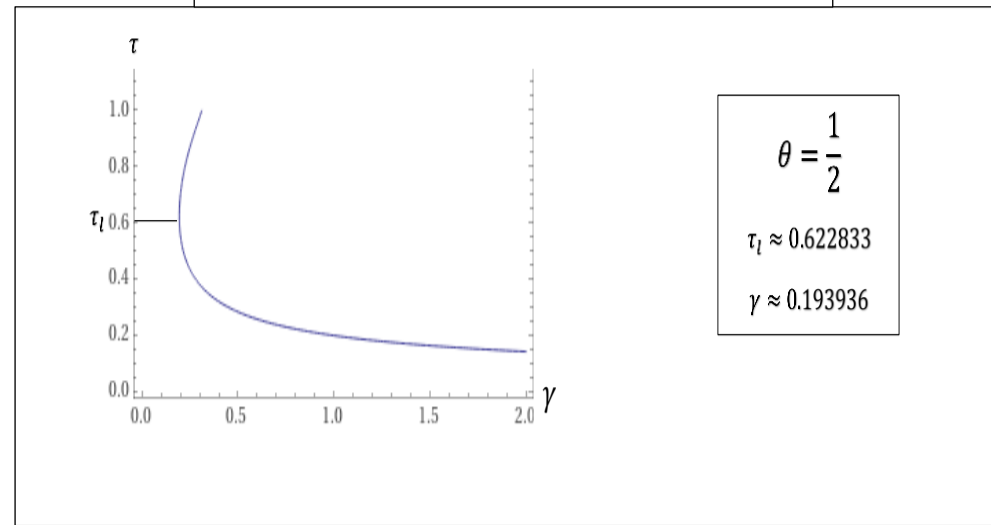


Figure 11: Relation between Y_f and τ if $\theta = \frac{1}{2}$

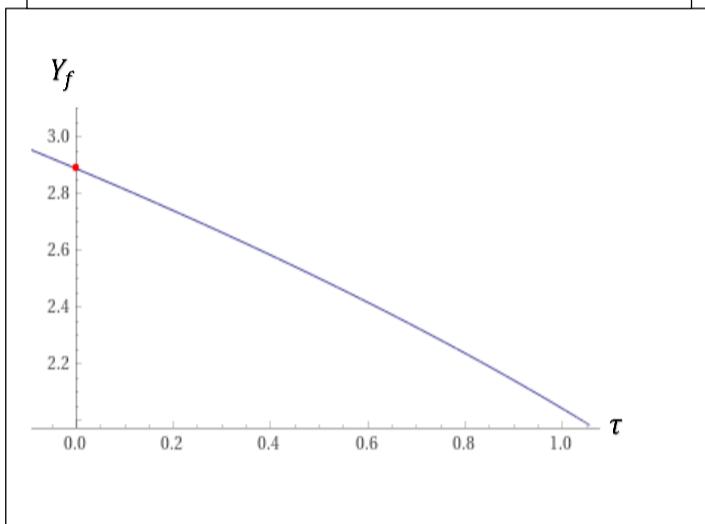


Figure 10: Relation between Y_i and τ if $\theta = \frac{1}{2}$

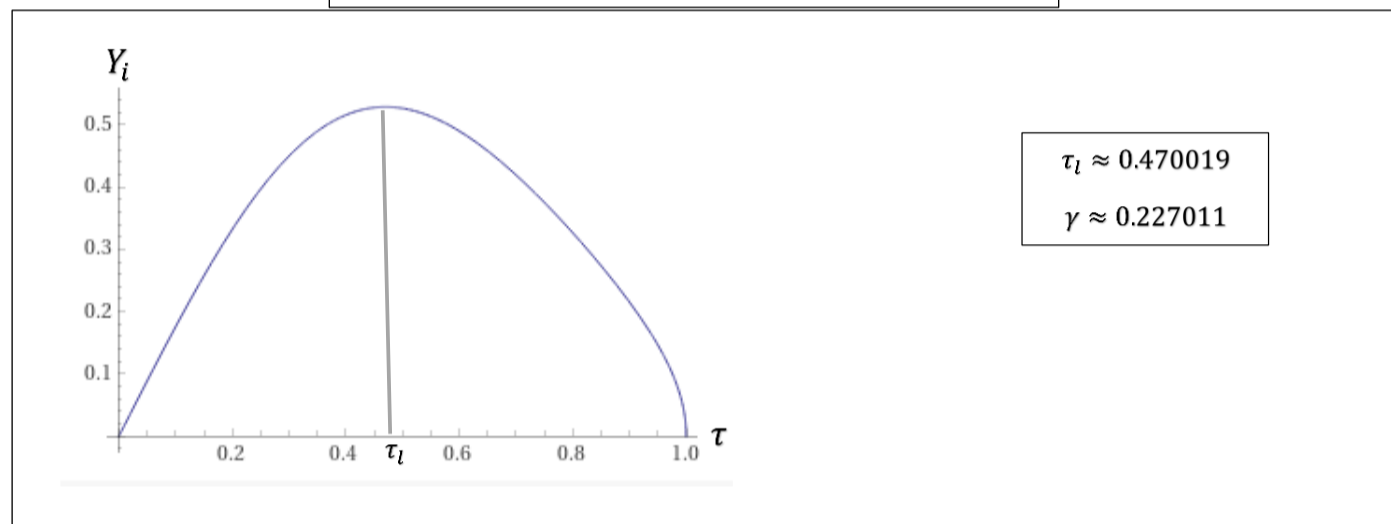


Figure 13: Relation between Y_c and τ if $\theta = \frac{1}{2}$

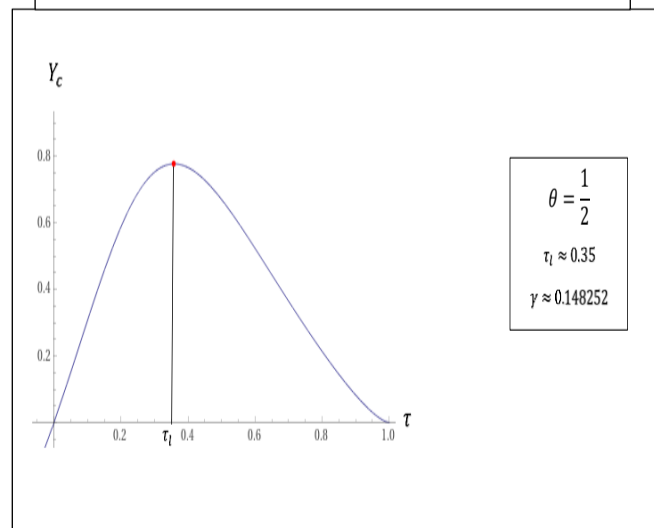


Figure 12: Relation between $(GNB = Y_f + Y_i)$ and τ if $\theta = \frac{1}{2}$

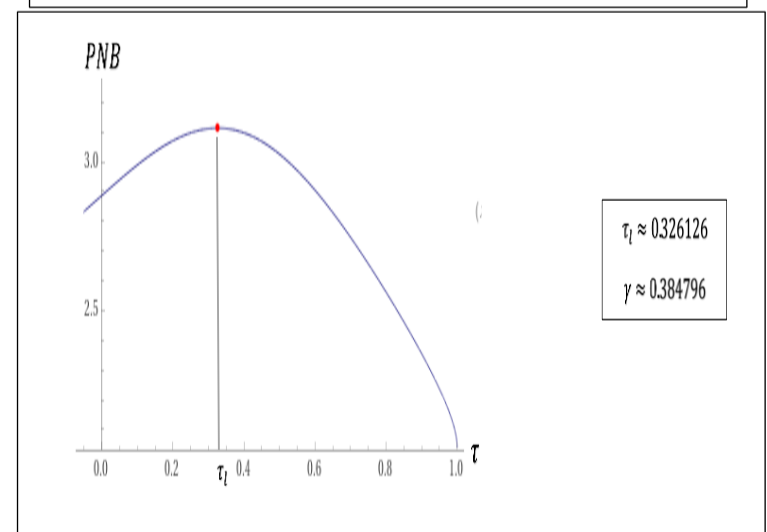


Figure 14: Relation between γ_c and τ when the government specifically targets criminal activities

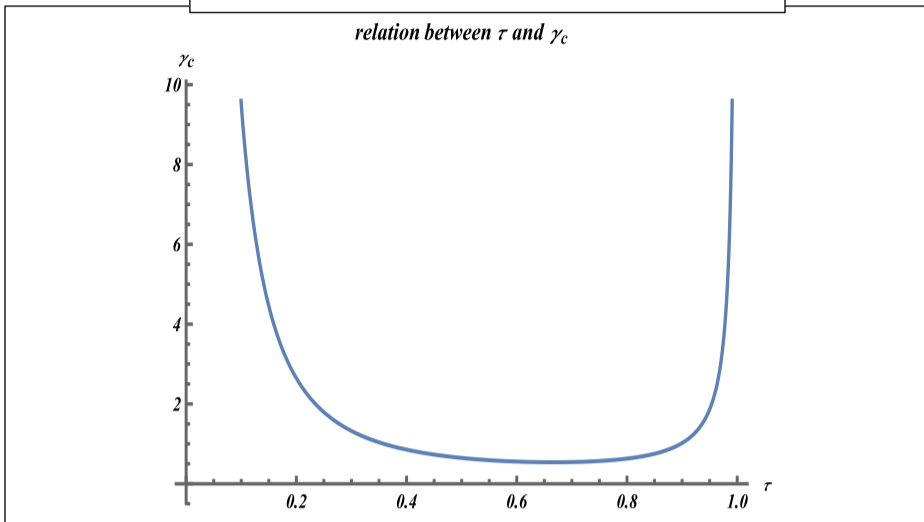


Figure 15: Relation between Y_c and τ when the government specifically targets criminal activities

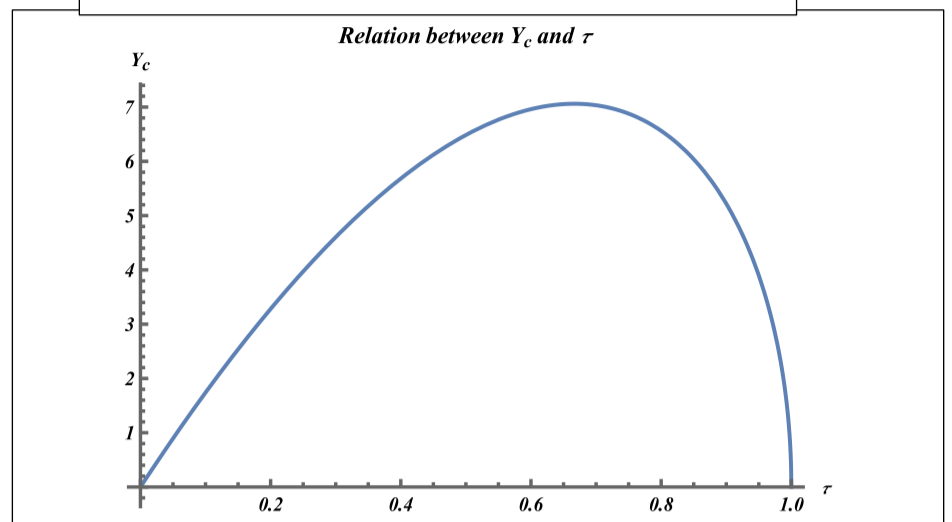


Figure 16: Relation between Y_i and τ when the government specifically targets criminal activities

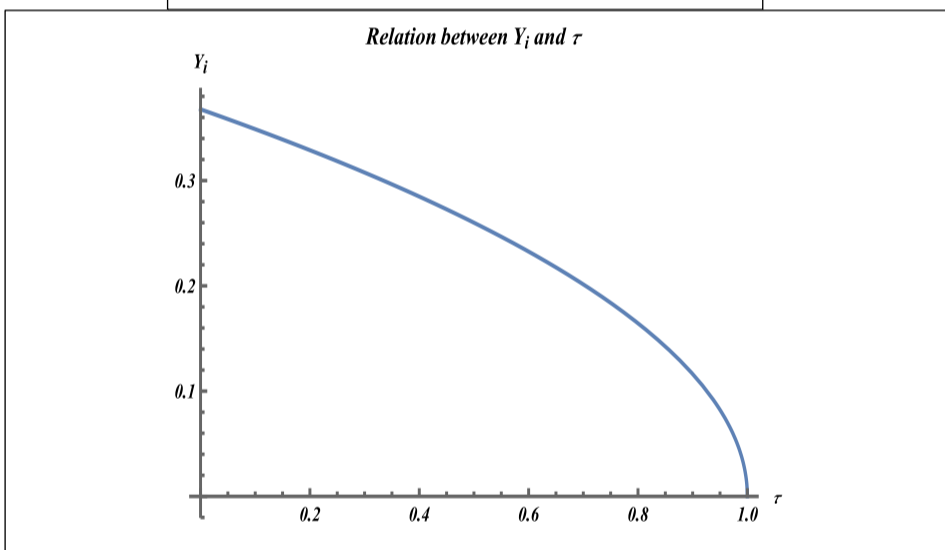
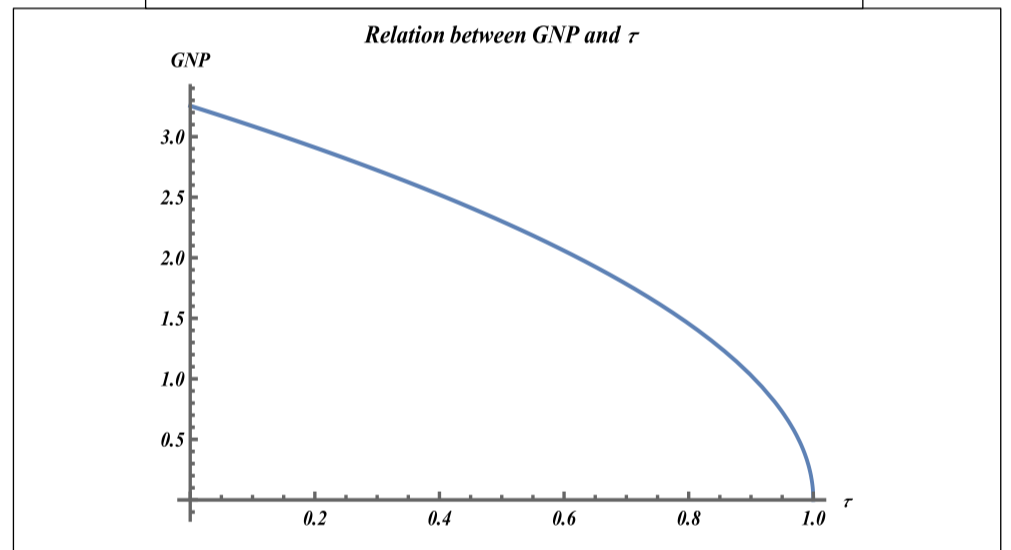


Figure 17: Relation between $(GNB = Y_f + Y_i)$ and τ when the government specifically targets criminal activities



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