Financial Looting and Controls on Resident Outflows

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Abstract

This paper proposes a theory of preemptive controls on capital outflows of residents as second-best tools to curtail boom-bust cycles in domestic asset markets and deter wealth transfers from uninformed but honest traders to pump-and-dump speculators (financial looters as in Akerlof and Romer, 1993), arising from imperfectly designed domestic financial regulation. In the model, looters either face domestic penalties or incur costs to export capital and relocate. In equilibrium, such controls decrease looting, stabilize asset prices, and reduce capital flight. The paper also discusses the prevalence of such practices and provides empirical evidence supporting the model's predictions.

JEL codes: F3, G1

Key words: Capital Controls, Financial Regulation, Financial Looting, Feedback Traders, Haven countries, House prices, Off-shore deposits, Preemptive Outflow CFMs.

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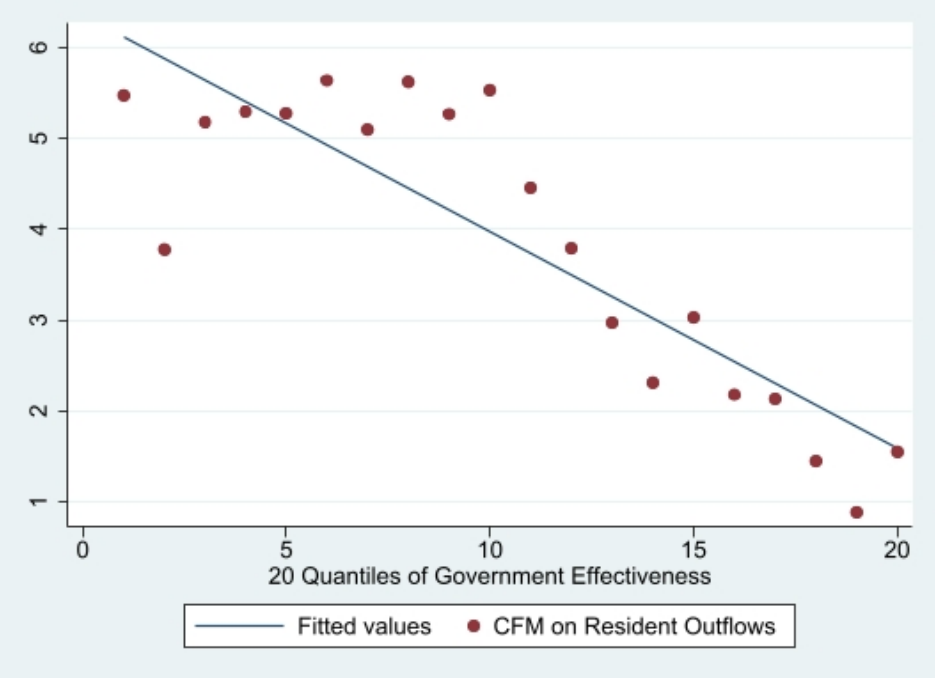
1 Introduction

The long-standing Washington consensus asserts that the free mobility of foreign capital can contribute to the development of strong domestic institutions. Indeed, allowing unrestricted entry and exit of foreign capital in a country's financial markets can create incentives for improving institutional quality. This paper proposes a theory that explains how allowing the residents of countries with weak institutions to freely move capital abroad can result in the exploitation of uninformed investors, who comprise the majority of market participants in these nations, and the generation of excess volatility in domestic asset markets. As a result, implementing preemptive controls on capital outflows by residents can mitigate the negative impact of weak institutions, helping to alleviate inefficient trading and reduce the occurrence of boom-bust cycles in domestic asset markets. The paper also presents evidence based on deposit outflows to haven countries, housing prices, and outflow controls on residents that aligns well with the model's main predictions.

Through the lenses of our model, capital controls on residents' outflows serve as a second-best policy when domestic regulation is ineffective because of weak institutional capacity to design it or enforce it. Figure 1 illustrates that, in the data, the use of outflow controls on residents decreases with the level of institutional development. That is, the lower the government's effectiveness, the more extensive are capital controls on residents' outflows. This second-best policy is then gradually abandoned as countries grow economically and institutionally. In fact, most advanced economies stopped using outflow controls in the 1980s, except for national security or anti-money laundering purposes. This association (which does not imply causation) is robust and does not depend on the particular indicator used to measure the degree of institutional development or capital account restrictions on residents.

In the paper, we also discuss anecdotal evidence on the prevalence of financial looting in both advanced and emerging economies and its importance in capital outflows in emerging economies. Based on housing price data from the 1970s, we then show that when real housing prices increase, a higher stringency of outflow controls on residents is associated with lower growth of off-shore deposits in more opaque financial centers, as our model predicts.

Figure 1: Government Effectiveness and CFMs on Resident Outflows



Note. Figure 1 plots the association between government effectiveness and the prevalence of CFMs on residents' capital outflows. The horizontal axis has the 20 quintiles of the government effectiveness index from the World Bank Worldwide Governance Indicators. The vertical axis is the average value of controls on residents' capital outflows within each quantile of government effective index. Controls on residents' capital outflows is measured as the sum of controls on residents' outflows for ten asset categories in Fernandez et al. (2016). The sample covers 100 countries from 1995 to 2019.

Building on the work of Akerlof and Romer (1993–henceforth AR) on the financial (in)stability consequences of imperfectly designed government regulation of domestic banks and corporations, our model shows that preemptive controls on capital outflows on domestic residents can mitigate boom-bust cycles in asset prices and speculative bubbles by deterring (or contributing to deter) the market entry of looters that exploit uninformed retail traders to their advantage, inflating asset prices above their fundamental values and inducing boom-bust cycles in asset prices.

The model starts with the domestic market of an asset in exogenous and fixed net supply and three types of traders: fundamental investors, speculators that following AR we call looters, and naïve or retail investors that are honest but uninformed. Fundamental investors are fully informed on the true asset value. They buy low and sell high. Looters are "pump and dump" traders. Naïve investors engage in positive feedback or momentum trading, as in Delong et al. (1990), buying or selling the domestic asset when the price goes up or down. There are four trading periods. In period 0, the demand of fundamental investors meets the fixed asset supply. In period 1, the looters endogenously choose to enter the market and push up the asset price taking into account the incentives provided by the policy regime. In period 2, uninformed naïve investors buy the asset after observing the previous price increase as a signal of its unknown fundamental value, while looters sell the asset and choose to either stay in the country facing a regulatory penalty, or to run away paying a tax to circumvent outflow controls and cover relocation costs. In period 3, the asset's true value is revealed, and the price returns to its fundamental value. The larger the mass of looters entering the market in period 1, the bigger the boom-bust cycle in the asset price and the implicit wealth transfer from naïve traders to looters. These effects and the associated asset price dynamics are stronger the more sensitive the naïve traders are to changes in asset price dynamics.

To curb speculation, the regulator imposes a heterogeneous penalty on looters. Looters can either face this penalty, or evade it by paying costs to circumvent capital outflow controls and also individual resettlement costs to flee the country. In the model's closed-form solution of the market equilibrium, preemptive controls on outflows not only directly limit capital flight in period 2, but importantly also reduce the entry and speculation in period 1. Preemptive controls on capital flows, therefore, can mitigate the resulting asset price

boom-bust cycle. We also find that an ex-post outflows tax that achieves the same stabilizing impact on capital flight is much higher than the corresponding ex-ante (preemptive) tax rate. Moreover, in our setting, by construction, ex-post outflow controls have no ability to deter speculation and looting in period 1.

The connection between our asset market speculators and AR's looters is indirect. Additionally, AR's notion of financial looting is nuanced.[1] Writing at the time of the S&L crisis in the United States in the early 1990s, AR start from the distinction between business strategies that lead to bankruptcy for profit and those involving subsidized risk-taking, and the observation that a large discrepancy can arise between the gains captured by "owners going for broke" and the social losses they generate. Consequently, they refer to "bankruptcy for profit" as "looting" because the private gain is smaller than the social cost imposed, as in a riot with looting. They begin their analysis by assuming that the government agrees to inefficient contracts embedded into domestic financial laws and regulations such as limited liability and deposit insurance that permit the emergence of these legal or semi-legal market practices, without explicitly providing a theory for the emergence of these institutional arrangements, but rather focusing on the consequences for market outcomes. Next, they describe the behavior of the private sector that responds to incentives provided by these inefficient government contracts and regulations. They then discuss several concrete historical examples of the interaction of private and public sectors that can lead to financial excesses, boom-bust cycles in asset prices and social losses.[2]

Our model builds on and modifies one particular version of AR's looting model that AR use to explain the boom-bust cycle in land prices in Dallas, Texas during the S&L crisis (See AR pp.36-39). Just like AR, we consider the potential entry of looters stemming from inefficient government regulation taken as given, and examine how looters can exploit the lack of information of naïve traders to their advantage. Furthermore, akin to their argument on the legal nature of looting in American financial markets, we do not dwell on the legal or semi-legal nature of the specific financial practices utilized to exploit uninformed retail traders. We

[1]The English definition of "looting", according to the Merriam-Webster dictionary is the act of robbing "especially on a large scale and usually by violence or corruption".

[2]In some instances, the private sector behavior and practices are legal, while in others the private activities are fraudulent, but this distinction plays a secondary role in their analysis.

extend a particular version of AR looting model by i) incorporating heterogeneous looters and endogenizing their entry into the market, ii) analyzing the impact of capital outflow controls and regulatory penalties for financial misconduct, and iii) considering a four-period economy. As a result, while in our model looters exploit naïve traders and the latter are feedback traders with upward-sloping asset demand curves as in AR, the functional form of the naïve traders' asset demand, strictly speaking, does not share the same microfoundation.

In addition to describing abundant anecdotal evidence on how prevalent the type of speculation and looting of our model is in advanced and emerging economies, and how important it might be in explaining capital outflows from countries with weaker institutional capacity, the paper directly tests the model's main prediction. This part of the empirical analysis focuses on understanding the repercussions of capital controls on residents' outflows toward more opaque financial centers as in Andersen, Johannesen and Rijkers (2022). Following Andersen et. al. (2022), we examine resident outflows into offshore banks in countries that are more protective of secrecy when domestic housing prices increase. The empirical analysis is based on unbalanced panel data for more than 60 developed and developing countries from 1970 to 2022. We find an association between higher housing prices and increased outflows to banks in haven countries, which is significantly tempered when a country implements capital controls on resident outflows in line with the main prediction of our model.

The main policy implication of the analysis is that, when domestic financial market regulation is imperfectly designed or enforced because of weak institutional capacity, possibly giving rise to looting-type behavior in domestic asset markets, preemptive outflow controls can have desirable redistributive and financial stability properties and are not simply bad policies. In our model, preemptive outflow controls can be regarded as second-best interventions to address both market and government failures. These include (a) the upward-sloping asset demand curve of retail investors stemming from naivete and asymmetric information; (b) imperfections in the government's regulation of domestic asset markets, giving rise to looting behavior that is pervasive in both developed and developing economies, but more acute in the latter; and (c), finally, imperfections in international coordination in reclaiming funds that leave a country illegally when regulation avoidance and violations mutate into outright illegal fraud. In our setting, the underlying issue of weak institutional capacity

remains, regardless of whether the financial account is open or closed.

From a political economy perspective, at an early stage of institutional development, adopting preemptive capital controls (particularly on residents) may be a more viable option than designing and enforcing effective domestic financial regulations for several reasons. Domestic interest groups, particularly financial institutions, typically oppose regulatory reforms that can curtail their profitability, exerting significant influence on the political process. Countries with limited international influence cannot elicit the cooperation of financial centers in pursuing avoidance or violation of domestic financial regulation. Lastly, the institutional infrastructure necessary for effective financial regulation is not always in place, which can make the simpler mechanism of capital controls a more viable immediate solution.

The theory of preemptive controls on capital outflows of residents that we propose can fall within the scope of typical provisions for such measures in the international financial architecture. The selective use of outflow controls by developed economies for special purposes such as sanctions, national security, and anti-money laundering is allowed in international frameworks, such as the OECD Code of Liberalization of Capital Movements and the IMF's Institutional View on the Liberalization and Management of Capital Flows. Within these frameworks, controls on capital outflows may also be endorsed under very special circumstances, such as near-crisis situations–e.g., IMF IEO (2020, 2022), and Ostry and Stiglitz (2022). Another notable permission is when capital account liberalization outpaces the capacity of the economy to safely handle the ensuing capital flows. Under the circumstance of premature liberalization, a temporary reimposition of outflow CFMs may be appropriate under the IMF's Institutional View. The outflow control policy of our theory is not concerned with capital flow cyclicality or macroeconomic stabilization. Our theory, therefore, suggests that the application of outflow controls could be expanded to situations where the capacity to design, implement, and enforce domestic financial regulations is insufficient compared to the potential risks to macroeconomic and financial stability associated with domestic financial liberalizations.

Our paper presents a theoretical framework for analyzing the repercussions of preemptive outflow controls on looting. In practical terms, policymakers should take into account multiple factors when considering such controls. First, prior to implementing capital controls, it is

imperative to substantiate the existence of looting. Strong evidence demonstrating instances of looting forms the foundational basis for justifying preemptive outflow controls. Second, a key aspect to consider is the presence of capital flight initiated by looters. This necessitates a thorough examination of capital movements surrounding domestic asset booms and busts. Third, policymakers should assess the macro-critical implications stemming from looting and the subsequent capital flight. Understanding the broader economic impact is essential for crafting effective and balanced policies. Addressing the above considerations will contribute to a more holistic understanding of the intricate relationship between preemptive outflow controls, looting, and their broader economic implications.

Finally, in our model, capital outflow taxes are exclusively applied to residents. It is essential to acknowledge, however, that certain residents may attempt to circumvent these controls by initially establishing offshore entities. Subsequently, they may utilize these offshore vehicles for engaging in looting within domestic asset markets. Such evasion strategies can potentially undermine the effectiveness of resident outflow controls in deterring looting activities. This underscores the need for considering the imposition of outflow controls on all potential looters, irrespective of their residency status, which may address the loophole created by the use of offshore vehicles for illicit activities. A comprehensive analysis of this aspect is deferred to future studies.

Related Literature Following a long string of costly domestic and international financial crises in the 1990s and the 2000s, the literature on policies for financial stability has mushroomed, stimulating renewed and strong interest in interventions that limit capital mobility—the so-called capital controls. This is a large literature, and our paper contributes in several dimensions.[3]

First, numerous papers propose capital control theories grounded on the presence of pecuniary and demand externalities arising from occasionally binding borrowing constraints —

[3]See Magud, Reinhart, and Rogoff (2018) for a survey of the literature on capital control as policies aimed at addressing fear of appreciation, fear of hot money as in Tong and Wei (2011), fear of large capital inflows, and loss of monetary autonomy as in the trilemma of international finance. See Rebucci and Ma (2019) for a survey of the newer literature on capital controls as instruments to address pecuniary and demand externalities or to manipulate the term of trade. See Erten, Korinek and Ocampo (2019) for a survey of the new literature on macroprudential and capital flow management policies, encompassing the traditional literature on capital account liberalization more broadly.

-e.g., Korinek (2010), Bianchi (2011), Benigno et al. (2013 and 2016)–or whenever monetary policy cannot achieve the first best allocation as in Farhi and Werning (2014), Schmitt-Grohe and Uribe (2016). Other papers focus on capital controls as tools to gain international competitiveness as in De Paoli and Lipinska (2013) or Costinot et al. (2014). In these models, controls are typically imposed on net capital flows. Additionally, these papers mostly focus on frictions and distortions on borrowers, and hence on the asset supply side. This literature typically also assumes no "instrument frictions" on the government's part. Our focus is on resident outflows in the presence of distortions on the demand side of the asset markets, taking the government's inability to implement perfect domestic financial regulation to address these distortions as given in the spirit of Akerlof and Romer (1993).

Second, paper relates to the literature on the interaction between domestic macroprudential policies and capital controls, focusing on whether they are substitutes or complements—e.g., Korinek and Sandri (2016), Jeanne and Korinek (2020), Adrian et al. (2020), and Borio, Shim and Shin (2022). Our model emphasizes the complementarity between outflow controls and policy actions to enforce domestic regulation, focusing on the interplay between domestic speculation and capital flights. We consider the effects of both domestic regulatory penalties and capital controls policies on looters' optimizing decisions and find an inverted U-shaped effect of domestic regulation on capital flights, which suggests that these policies complement each other.

Third, our paper also contributes to the literature on capital account liberalization and the development of the domestic financial sector. For example, Aoki, Benigno, and Kiyotaki (2009 and 2015) and Basu et al. (2020) illustrate how the optimal degree of capital account openness or the desirability of preemptive CFMs depend on financial development. Stiglitz (2000) argues that restrictions on residents' outward investments should be lifted only gradually to protect reserves and maintain stability in the banking system that finances the domestic economy. Our model emphasizes the importance of taking into account the destabilizing impact of speculative activities stemming from the absence of effective regulation of such activities in the process of capital account liberalization.

Fourth, our paper contributes to the literature that examines the connection between the quality of institutions and CFM policy on capital inflows, as for example in Ma and

Wei (2020) and Basu et al. (2020). These papers stress the potential benefits of restrictions on capital flows at an early stage of institutional development or in the presence of underdeveloped markets. We propose a novel mechanism that highlights how the quality of institutions can affect the desirability of preemptive CFM measures on capital outflows. A closely related paper, here, is Chang, Fernandez, and Martínez (2023), which also focuses on outflow controls, considering the ex-post introduction of outflow controls on nonresidents in the event of a crisis, and focusing on issues of imperfect credibility and limited commitment by the government. In this paper, we examine ex ante (i.e., preemptive) capital controls on residents' outflows in normal times.

Fifth, Fernandez et al. (2015), Eichengreen and Rose (2014), and Acosta-Henao et al. (2021) find that countries do not use preemptive capital controls in a countercyclical way as the new theories suggest.[4] However, the use of persistent controls on outflows in middle and low income countries is widespread (e.g., Klein, 2012; Fernandez et al. 2015). One explanation of these facts is that capital controls signal future bad policies (Bartolini and Drazen, 1997). Other explanations include, for example, that capital controls may distort the efficient allocation of savings, hinder risk sharing and limit diversification opportunities. In other words, capital controls are simply bad policies implemented by governments that don't know or cannot do better. Our theory rationalize the use of capital controls in countries with weak institutions.

Our paper naturally relates to the extensive finance literature that highlights how the naïve behavior of certain investors can be exploited, as demonstrated by the works of Delong et al. (1990), Allen and Gale (1992), Akerlof and Romer (1993), Shiller (2003), Barberis and Thaler (2003), Gennaioli and Shleifer (2018), Hirshleifer (2015, 2020), and Akerlof and Tong (2021). For instance, DeLong et al. (1990) find that the early buying of rational traders can trigger positive-feedback trading of naive traders, thereby increasing price volatility. Our model incorporates this feedback trading mechanism and examines how outflow controls can help stabilize the associated asset price dynamics. A closely related paper is Brunnermeier,

[4]Based on more granular and updated data on policy adoption, Das, Gopinath, and Kalemli-Özcan (2022), not only show more adoption than previously reported, but also that preemptive inflow CFM can reduce emerging markets and developing countries' external finance premia during risk-off shocks. However, they do not find such a stabilizing effect associated with outflow controls. We propose a different rationale for the adoption of outflow controls and find suggestive evidence of effectiveness.

Sockin, and Xiong (2022). They show that China's financial markets predominantly consist of uniformed retail investors, resulting in significant price volatility and high turnover rates.[5] They find that by mitigating the market fluctuations caused by retail investors, government intervention can improve welfare.[6] Our paper shares the focus on speculative activities in a market populated by naive traders. By studying outflow CFMs in such a setting, we can evaluate its effects on both initial speculation and subsequent capital flight.

Finally, the literature provides various explanations for why countries may impose controls on capital outflows during non-crisis periods. One important explanation is the trilemma in international finance, which suggests that a country cannot simultaneously peg its exchange rate, maintain an independent monetary policy, and permit free cross-border financial flows. Therefore, capital controls may be used by countries to maintain a stable exchange rate or monetary independence, as discussed by Gourinchas and Obstfeld (2012), Rey (2013), Klein and Shambaugh (2015), Han and Wei (2018), Eichengreen and Esteves (2019) and Obstfeld, Ostry, and Qureshi (2019). In addition, capital controls on outflows can also be used for financial repression purposes as in Aizenman and Pasricha (2013), Liu et al. (2021). Aizenman and Pasricha (2013), in particular, find that the relaxation of control on outflows reduces fiscal revenues. Our paper contributes to this literature by illustrating how countries may use capital controls on outflows to reduce speculation and related boom-bust cycles in asset prices and additional pressure on the FX market.

The paper is organized as follows. Section 2 spells out the concept of financial looting and how our model relates to that. Section 3 describes the model and its solution. Section 4 reports the normative analysis and discusses its main policy implications. Section 5 discusses some extensions and the associated policy implications. Section 6 investigates empirically the prevalence of financial looting and the extent to which outflow controls may be an effective antidote. Section 7 concludes. The Appendix contains proofs and other technical details.

[5]International benchmark-driven investors, akin to our naive domestic investors, also play a critical role in driving capital flows in emerging economies (e.g., Arslanalp and Tsuda, 2015; Arslanalp et al. 2020).

[6]The phenomenon of small investors in China have been discussed as well in Wall Street Journal (7/31/2023), under the title of "Small Investors Are a Big Problem in China": " Some market participants think fewer individual investors could be a good thing for the market. China's small investors have developed a reputation over the last decade for being gamblers, prone to excesses of hope and fear. They helped fuel a bubble in 2014 and 2015—as well as the crash that followed. Chinese authorities have occasionally taken steps to discourage too much stock market speculation".

2 Akerlof and Romer's financial looting

In this section, we discuss the concept of financial looting in the sense of AR and provide examples in domestic asset markets such as the housing and equity markets.

At the core of the financial looting concept of AR, there is a limited liability corporation (a developer or a stock broker or financial intermediary) and a government that is willing to bail out the lenders of these corporations for a notional value greater than the fundamental value of the assets they hold in their portfolios. Suppose a government agrees to bail out any lending to such corporations, only subject to the restriction that the owners/managers cannot divert more than a fixed amount. AR show that, if the upper bound set on the bailout is smaller than the true value of the corporation's assets, the owner will maximize its value. However, if the bailout limit is allowed to be greater than the corporation's value, the owner leverages up to the bailout limit and runs away with the funds, with no incentive to maximize the firm's value.[7]

AR call this behavior bankruptcy for profit to distinguish it from bankruptcy for risk-taking. Moreover, they take this seemingly irrational policy regime as given, asserting that it characterizes well government behavior even in advanced economies, such as the United States. They document its prevalence in both advanced and emerging countries, suggesting that the distinction between legal and illegal practices that give rise to the equilibrium in their model is a second-order issue.[8]

The land market and the stock market provide illustrative examples. The 2022 spectacular FTX bankruptcy in the US crypto market, the 2007-08 Subprime Mortgage crisis, the Italian corporate bond market in the early 2000s, and many other cases can be framed in a similar manner.

Consider a housing market working as follows. There are three periods, 0, 1 and 2. Banks lend money to the developers. The developers buy land and build houses, or alternatively, banks buy land and hire developers to build houses. There are three types of developers: fundamental or informed, parasitical or looters, and uninformed or copycats as AR call them.

[7] "*A looting strategy amounts to a sophisticated version of having a limited liability corporation borrow money, pay it into the private account of the owner, and then default on its debt*", AR p.5.

[8] This is reminiscent of the distinction between "tax avoidance" (which is legal) and "tax evasion" (which is illegal).

Looters buy land in period 1 (pumping up the land price) and sell in period 2 (dumping land and thus depressing prices). Fundamental developers are always in the market. Copycat developers are feedback or momentum traders, who rely on price dynamics to infer the true value of land. Land supply is controlled by local authorities controlling zoning regulations or selling long-term leases. Developed properties are purchased by households. The land supply is homogeneous and a certain number of parcels of land is needed to build a house (i.e., the production function is linear in land and land is the only input). There is a homogeneous retail demand for houses by households and a heterogeneous supply from the three types of developers. Some houses are built by fundamental builders. Some by copycat builders, and some by looters. The land market clears competitively period by period, while the housing market may not, as China's housing market burst in the 2020s vividly illustrates.

Uninformed developers buy overvalued land from the government or from looters in period 2. Looting developers exploit uninformed ones by pumping up the land price in period 1 and dumping in period 2. These developers are looters in the sense that their private wealth gains are much smaller than the collective losses inflicted on the honest momentum builders, the inefficient land and house supply dynamics, and the excess land and house price volatility that affects all agents.

Consider now an equity market with looters. Stock investors are heterogeneous. Retail investors are uninformed momentum traders, fundamental investors are informed, and as before looters buy in period 1 and sell in period 2. Equity issuers are firms. Here the supply of equity capital (demand for equity funding) is homogeneous. The demand side is heterogeneous. How is the pump-and-dump trader a looter in the stock market? These buyers of stocks use leverage from intermediaries to buy stocks. Under limited liability, they can borrow up to the limit allowed by the government with banks lending them more than the value of the asset. So they leverage more than the value of their portfolio, knowing that they will be bailed out by the government when the price falls.

AR first proposed a microfounded model of this activity. Then, in a case study of a boom-bust in land prices in Dallas (TX), they showed how the exogenous entry into the land market of a small mass of looting developers can triggers the development of a bubble in land prices and building activity whose bursting costs is borne by honest but uniformed

developers, who fail to understand the source of the price increase during the boom phase. They do so in a simple, tractable rational asset price model with feedback trading and exogenous looter entry.

In the next section, we formulate a similar model of a domestic asset market in which looting is endogenous and the government attempts to contain it with domestic regulation and capital controls but, by assumption, cannot eliminate it. Consistent with the new theoretical literature on capital controls, domestic regulation and capital control policies are second-best interventions that take the underlying frictions as given and not removable. The first-best, therefore, is not attainable by assumption.

3 The Model

In this section, we set up a simple model of a domestic asset market with looting, similar to Akerlof and Romer (1993), De Long et al (1990), and Brunnermeier et al (2022). This could be a stock market, the housing market, or the onshore segment of the FX market. What is critical, is that we focus on the behavior of domestic residents.

We first describe the model's environment and main assumptions. Next, we discuss market clearing period by period. We then describe the assumed policy regime and discuss the three choices faced by looters: (1) no looting; (2) looting and staying in the country, and (3) looting and fleeing the country. Finally, we present the market equilibrium in terms of asset prices and quantities demanded by each agent.

3.1 Environment and assumptions

There are four periods in the model, $t = 0$, 1, 2, and 3, and three types of investors in the market: fundamental investors, naive investors, and looters.[9]

Fundamental investors know the true value of the asset, A, and have the following demand

[9]We use the term "naive" rather than "copycat" as in AR because the microfoundations of their demand is different. Unlike AR's copycat investors, our naive traders are behavioral and do not have rational expectations–their estimate of the fundamental value of the asset is biased. As we discuss below, they are closest to the noise (positive feedback) traders in De Long et al (1990).

function, D_t^f, in each period t:

$$D_t^f = A - P_t, \tag{1}$$

where A reflects the asset's true value, and P_t is the asset price at time t. Fundamental investors buy low and sell high. Their trading behavior is similar to that of the rational informed speculators in Delong et al. (1990), the informed investor in AR or Brunnermeier et al (2022). Their presence tends to stabilize the market. We assume that fundamental investors face limits to arbitrage as in Shleifer and Vishny (1997), so that their trading will not necessarily equalize the market price with the fundamental value period by period.

Naive investors are positive-feedback (or momentum) traders, similar to those in Delong et al. (1990) and to the "copy-cat" traders in AR, or the retail traders in Brunnermeier et al (2022). They do not know the true value of the asset, A, so they uninformed. Unlike in AR, they have biased expectations about A. They buy the asset when the price increases from the previous period, and sell the asset when the price drops.[10]

Their demand D_t^n in period t is

$$D_t^n = \beta \left(P_{t-1} - P_{t-2} \right), \tag{2}$$

with $\beta > 1$. Here β is the sensitivity of naive investors to price changes.[11] We interpret naive investors as retail traders in the stock market or honest but uninformed developers in the housing market.

As in AR, we model looters as "pump-and-dump" traders manipulating the market. Critically, the presence of looters and their actions are unknown to naive traders. Looters buy the asset at $t = 1$ and sell it at $t = 2$. Their demand is denoted D_t^l and will be solved in the equilibrium. In AR, the demand is exogenous.

[10] In AR, the copycat investors are uninformed about the true value of the asset and infer this from the market price dynamics, but their expectations are rational and their entrance into the market is exogenous. In our setting, momentum traders do not have rational expectations and the implied estimate of the true asset value is biased, but we model looters's entrance as endogenous.

[11] Assuming that $\beta > 1$ is reasonable, provided there is a sufficiently large number of naive traders. β essentially captures the aggregate demand of naive traders, determined by multiplying the number of naive traders by the individual demand of each trader.

For simplicity, the asset is in fixed supply:

$$S_t = B, \tag{3}$$

for all t. However, it is straightforward to allow for an upward-sloping supply function.[12]

3.2 Market clearing

In each period, market clearing requires:

$$D_t^f + D_t^n + D_t^l = S_t. \tag{4}$$

So we now describe the supply and the demand of each agent period by period.

Period 0

In period 0, there are only fundamental investors in the market, with demand D_0^f equal to $A - P_0$. Naive investors are not in the market as there is no prior change of price. Looters have not entered the market, so their demand D_0^l is 0 as well. Market clearing thus implies:

$$A - P_0 + 0 + 0 \ = B \tag{5}$$

and

$$\hat{P}_0 = A - B, \tag{6}$$

where $\hat{P}_0$ clears the imbalance between demand and supply.

Period 1

In period 1, fundamental investors have a demand of D_1^f equal to $A - P_1$. Naive investors continue to stay out of the market as there is no prior price change. The looters enter the

[12]The supply of land could also depend on lagged price dynamics, as it does in practice, and deliver a rich set of implications for the time evolution of the quantity supplied and the persistence of the bubble burst. In particular, in this case, the price impact of looters will be smoother but more persistent due to the distortion induced on the asset supply.

market with a demand of D_1^l that we determine later. Market clearing implies

$$A - P_1 + 0 + D_1^l = B, \tag{7}$$

and

$$\hat{P}_1 = A - B + D_1^l. \tag{8}$$

Period 2

In period 2, fundamental investors have a demand of D_2^f equal to $A - P_2$. Naive investors enter the market with demand D_2^n equal to $\beta\left(\hat{P}_1 - \hat{P}_0\right)$, as they observe the price change from period 0 to 1. The looters exit the market, so $D_2^l = 0$. Market clearing thus implies:

$$A - P_2 + \beta\left(\hat{P}_1 - \hat{P}_0\right) + 0 \ = B. \tag{9}$$

Substituting for $\left(\hat{P}_1 - \hat{P}_0\right)$, we have:

$$\hat{P}_2 = (A - B) + \beta D_1^l. \tag{10}$$

The looters' demand in period 1 affects the market price in period 2 even though looters have already left the market because naive investors' demand depends on the market price in the previous period. Looters, therefore, exploit the naive investor behavioral biases. In other words, in this market, looters engineer resource extraction from naive investors as in Akerlof and Romer (1993).

Period 3

In period 3, the true value of A becomes public information.[13] Fundamental investors continue to demand D_3^f equal to $A - P_3$. Naive investors' demand, D_3^n, is assumed to revert to 0 as the value of A becomes publicly known. The looters will also have a zero demand of

[13]In a housing market, the true value of A may reveal itself through persistent high vacancy rates, as during the house price burst in China in the 2020s.

D_3^l. Market clearing in period 3 implies:

$$A - P_3 + 0 + 0 = B \tag{11}$$

and the market price reverts to its fundamental value as in period 1

$$\hat{P}_3 = A - B. \tag{12}$$

The boom-bust cycle in this market features excess asset price volatility relative to the equilibrium without looters that is assumed to be welfare-reducing as in Brunnermeier, Sockin, and Xiong (2022). Additionally, note that if naive investors were leveraged, the looters' exit can trigger margin calls and firesales, causing the asset prices to fall below fundamental values.

3.3 The policy regime

We assume that the government takes the behavioral biases of retail investors as given and attempts to prevent market manipulation and looting by imposing an individual-specific penalty in period 3. This penalty reflects the individual ability to avoid regulatory sanctions, including legal ones. However, looters can avoid this penalty by circumventing capital controls to move funds abroad and relocate, incurring a common capital outflow tax on the sale price of their holdings, ϕ, and an individual-specific cost, η_i.

We interpret ϕ as the average cost of transferring funds illegally abroad, and η_i as the additional individual-specific costs of resettling abroad. One can think of ϕ either as the tax paid directly to the government, the fees paid to financial institutions to move money abroad legally, or the cost of moving money illegally through underground markets, including cryptocurrency, or the cost of moving money abroad through the use of multiple individual exemption quota. For example, in China, households can freely move money abroad below the annual 50k quota and reportedly rely on the extended family and the social network to circumvent this limit, incurring various costs. The government has the ability to influence ϕ in all the above interpretations, although the specific tools may vary. For example, the government can increase taxes, increase fees for financial institutions, crack down on crypto

market, or reduce the maximum quota for outflows. All these measures can be represented as a tax on the sale price, $P\phi$. Additionally, investors that want to move funds abroad above the legally permitted quota face an individual-specific cost of relocation that, like the domestic penalty, depends on individual circumstances.

In equilibrium, for fundamental and naive investors who do not face penalties, absent a diversification motive or a return differential with foreign assets from which we abstract in this model, staying in the country is always a dominant strategy. In other words, naive and fundamental investors have no incentive to flee. In contrast, looters face a trade-off between the domestic penalty and the cost of circumventing capital controls.

It is important to note that in this setting, looters' capital outflows are not motivated by traditional rationales such as diversification, liquidity demand, or superior risk-adjusted expected returns. Instead, capital outflows are solely driven by the attempt to evade domestic penalties for market behaviors that are welfare-reducing because they exploit uninformed investors and lead to boom-bust cycles in domestic asset markets and excess asset price volatility.

We model the distortionary and diversification costs of the capital outflow tax as a policy implementation cost for the government. Additionally, in the domestic asset market, there are no foreign traders. Therefore, there is also no capital inflow into this economy, although we present an extension of the analysis considering foreign traders in the Appendix.

3.4 Looters' asset demand and equilibrium prices

We now discuss the determination of the asset demand from looters in period 1, D_1^l, and the equilibrium asset price in periods 1 and 2. We first determine the equilibrium mass of looters by assuming that they take P_1 and P_2 as given. We then jointly solve for equilibrium P_1, P_2 and D_1^l through equations (8), (10), and the relevant expression for D_1^l taking into account the relevant boundary conditions imposed by the policy regimes.

3.4.1 Looters' payoffs and behavior

Assume that we have a unit mass of potential looters, indexed by i. Given the incentives provided by the policy regime, depending on their individual expected profit, looters must

decide whether to loot and pay the penalty to stay in the country, to run away and pay the costs associated with circumventing the capital controls, or stay out of the market and not loot.

The profit of looter i who stays in the country and pays the penalty imposed by the government is

$$\pi^i_{stay} = (P_2 - P_1)(1 - \omega_i). \tag{13}$$

As noted earlier, the individual-specific penalty rate, ω_i, accounts for the unique circumstances of each looter. This includes factors such as their level of political influence and connections with regulators, or the heterogeneous cost of a legal defense. For example, we can think of ω_i as the penalty faced by Sam Bankman-Fried in his spectacular bankruptcy case in 2022-23. In countries where institutions are weak and with a lack of enforcement capacity, the effective penalty faced by each looter may differ even when the nominal penalty is uniform. Without loss of generality, we assume that ω_i is uniformly distributed between $[0, \bar{\omega}]$. When $\omega_i = 0$, the looter can keep all profits from speculation in period 1. When $\omega_i = 1$, the looter is expropriated of all profits. When $\omega_i > 1$, the looter incurs a loss.

In order to avoid the penalty, looters can leave the country by paying a uniform capital outflow tax rate ϕ to circumvent existing capital outflow restrictions. Running looters also face an individual-specific cost depending on the international transaction technology they can access, the currency denomination of choice, and the relocation destination. Thus, looter i's profit from running away is

$$\pi^i_{run} = (P_2(1 - \phi) - P_1) - \eta_i, \tag{14}$$

where η_i is the resettlement cost after leaving the country. We assume η_i has a uniform distribution between $[0, \bar{\eta}]$.

Based on the relative magnitude of π^i_{stay} and π^i_{run}, looter i may take one of the following three actions, x_i:

- (i) $x_i = 0$, i.e., no looting at $t = 1$;

- (ii) $x_i = 1$, i.e., looting at $t = 1$ and staying in the country at $t = 2$;
- (iii) $x_i = 2$, i.e., looting at $t = 1$ and running away at $t = 2$.

The looter i's decision, x_i, depends on the following conditions:

$$x_i = \left\{ \begin{array}{c} 0 \text{ if } \pi^i_{stay} \leq 0 \text{ and } \pi^i_{run} \leq 0 \\ 1 \text{ if } \pi^i_{stay} \geq \pi^i_{run} \text{ and } \pi^i_{stay} > 0 \\ 2 \text{ if } \pi^i_{stay} < \pi^i_{run} \text{ and } \pi^i_{run} > 0 \end{array} \right\}. \tag{15}$$

3.4.2 Looters' decisions and the policy regime

When are the conditions above for a certain individual decision satisfied? And which fraction (or mass) of potential looters enters the market given the incentives provided by the policy regime and asset market prices? It is immediate to see that:

$$\pi^i_{stay} > 0 \quad \Leftrightarrow \quad \omega_i < 1. \tag{16}$$

Similarly,

$$\pi^i_{run} > 0 \quad \Leftrightarrow \quad \eta_i < \left(P_2 \left(1 - \phi\right) - P_1\right). \tag{17}$$

Last, given (13) and (14), we have that

$$\pi^i_{stay} < \pi^i_{run} \quad \Leftrightarrow \quad \omega_i > \frac{P_2\phi + \eta_i}{P_2 - P_1}. \tag{18}$$

The condition (18) states that if the penalty ω_i, which can be larger than 1, is greater than a certain threshold, the looter i will run away rather than stay when he engages in looting. On the contrary, if a looter runs away, the penalty must be larger than this threshold. With a large enough penalty, we can also have that for some looters, $\pi^i_{stay} < 0$. On the other hand, with a high enough capital outflow tax ϕ, it is also possible that $\pi^i_{run} < 0$. It follows that, in a regime in which both controls on capital outflows and penalties for illegal financial activities are high enough, both $\pi^i_{stay} < 0$ and $\pi^i_{run} < 0$, and looter i will not speculate in

period 1. This raises the possibility that an appropriate level of ϕ may not only decrease outflows of looted capital in period 2, but also dampen looting activity ex-ante in period 1, thus removing this specific source of capital flight pressure. As a result, $\hat{P}_1$ and $\hat{P}_2$ also decline, driving π^i_{run} and π^i_{stay} further into negative territories, potentially dissuading even more looters from entering the market in period 1. This feedback loop will persist until the market reaches its equilibrium. To analyze this possibility, we now fully solve the model.

3.4.3 Equilibrium

In the model, equilibrium asset prices in period 1 and 2 depend on the fraction of agents that choose to loot, while the equilibrium fraction of looters in period 1, in turn, depends on asset prices and the boundaries of the policy regime that are a function of ϕ, $\bar{\eta}$, and $\bar{\omega}$. In particular, the decision rule of looter i depends on the position of agent i relative to the boundaries conditions, which in turn depend on $\bar{\omega}$ _and_ $\bar{\eta}$, given the assumed distribution for ω_i and η_i. Therefore, we first derive the equilibrium mass of looters for given asset prices and the limits of the parameter space in Appendix A. We then solve simultaneously for the equilibrium mass of looters and the equilibrium prices. We summarize the equilibrium of the model with the following proposition whose proof is in Appendix B. [14]

Proposition 1. *Equilibrium Looting Mass and Asset Prices.* In equilibrium, the looters' demand is

(19)
$$\tilde{D}_1^l = \left\{ \begin{array}{c} \frac{1}{\bar{\omega}} \text{ if } \phi \geq \frac{\beta-1}{\bar{\omega}+\beta} \text{ and } \bar{\omega} > 1 \text{ and } \bar{\eta} > \left((1+\beta)(1-\phi)-2\right) \\ \frac{\bar{\eta}-(\bar{\omega}-1\ )\phi}{\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )(\beta-\beta\phi-1)} \text{ if } \phi < \frac{\beta-1}{\bar{\omega}+\beta} \text{ and } \bar{\omega} > 1 \text{ and } \bar{\eta} > \left((1+\beta)(1-\phi)-2\right) \\ 1 \text{ if } \bar{\omega} \leq 1 \text{ or } \bar{\eta} \leq \left((1+\beta)(1-\phi)-2\right) \end{array} \right\},$$

and the period 1 and 2 asset prices are:

(20)
$$\tilde{P}_1 = 1 + \tilde{D}_1^l,$$

(21)
$$\tilde{P}_2 = 1 + \beta \tilde{D}_1^l.$$

[14] Readers who are not interested in the construction of the equilibrium can skip Appendix A and B.

Proof See Appendix B.

This proposition summarizes the joint determination of the share of looters in period 1 and the asset prices that clear the market in period 1 and 2 depending on the values of the tax on capital outflows and the relocation cost and the upper bounds on the individual regulatory penalty.

4 Domestic Regulation, Outflows Controls, and Looting

We now discuss some properties of the model, including the roles and the effects of outflow controls and domestic regulation in this setting.

4.1 Outflow Controls

4.1.1 The effects of preemptive outflow CFMs

The capital control tax, ϕ, has two effects. First, a higher ϕ induces looters to stay in the country rather than run away in period 2 by affecting the relative profitability of staying vs running away in (18) through $\frac{P_2\phi+\eta_i}{P_2-P_1} < \omega_i$. Second, and more importantly, ϕ can also affect $\tilde{D}_1^l$ in period 1.

To see the second effect, consider the equilibrium level of looting in period 1, $\tilde{D}_1^l$, in Equation (19). In equilibrium, $\tilde{D}_1^l$ increases from $\frac{1}{\bar{\omega}}$ in the first branch of (19), to $\frac{\bar{\eta}-(\bar{\omega}-1\ )\phi}{\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )(\beta-\beta\phi-1)}$ in the second branch, reaching a maximum of 1 in the third branch.

As ϕ increases, $\tilde{D}_1^l$ may continue to be determined in the same branch of the solution or move down one or two branches in which $\tilde{D}_1^l$ is smaller. If $\tilde{D}_1^l$ was originally determined in the third branch, a higher ϕ makes the boundary condition of $\bar{\eta} \leq ((1+\beta)(1-\phi)-2)$ less likely to hold, pushing $\tilde{D}_1^l$ down to be determined in the second or first branch of the solution if ϕ is set above certain thresholds. If $\tilde{D}_1^l$ was originally determined in the second branch, then a higher ϕ makes the boundary condition of $\phi < \frac{\beta-1}{\bar{\omega}+\beta}$ less likely to hold, pushing down $\tilde{D}_1^l$ to be determined in the first branch when ϕ is set above a certain threshold. If $\tilde{D}_1^l$ was originally pin-down by the first branch, then a higher ϕ will not shift $\tilde{D}_1^l$ to the second or third branch, and the equilibrium share of looting stays constant at its minimum value.

As a result, $\tilde{D}_1^l$ will remain the same or decrease with higher ϕ, as ϕ affects either the equilibrium mass of looters or the boundary conditions or both. Furthermore, as $\tilde{D}_1^l$ decreases with ϕ, so do the equilibrium asset prices $\tilde{P}_1$ and $\tilde{P}_2$. Therefore, a higher ϕ discourages the participation of looters in period 1 and reduces price volatility in all periods.

Note also that, when $\tilde{D}_1^l = \frac{\bar{\eta}-(\bar{\omega}-1\ )\phi}{\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )(\beta-\beta\phi-1)}$, we have

$$\frac{\partial \tilde{D}_1^l}{\partial \beta} = \frac{(\bar{\omega}-1)\left(\bar{\eta}-(\bar{\omega}-1\ )\phi\right)(1-\phi)}{\left(\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )\left(\beta-\beta\phi-1\right)\right)^2}, \tag{22}$$

and

$$\frac{\partial^2 \tilde{D}_1^l}{\partial \beta \partial \phi} < 0. \tag{23}$$

This shows that, as β increases, i.e., the sensitivity of the naive traders to price changes is higher, the depressive effect of ϕ on looting and volatility will be stronger. In other words, when the naive investor is more responsive to price changes in the market, controlling outflows can have a greater impact on speculation and reduce market volatility.

4.1.2 Ex ante vs ex post outflow capitals

In the model, the capital control tax is announced ex-ante, so that looters take it into account in period 1. In contrast, if looters only know about the tax in period 2, capital controls cannot reduce looters' asset demand D_1^l in period 1. The ex post announcement cannot not affect P_1 and P_2 either.

Consider the case in which the tax rate ϕ is announced only ex-post in period 2. The the equilibrium mass of looting $D_{1,post}^l$ obtained by setting $\phi = 0$ in (19) becomes:

$$D_{1,post}^l = \left\{ \begin{array}{c} \frac{\bar{\eta}}{\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )(\beta-1)} \text{ if } \bar{\omega} > 1 \text{ and } \bar{\eta} > (\beta-1) \\ 1 \text{ if } \bar{\omega} \leq 1 \text{ or } \bar{\eta} \leq (\beta-1) \end{array} \right\}. \tag{24}$$

An ex-post outflow control intervention can limit period 2 capital flight, but we can see from (24) that it cannot affect the equilibrium mass of looting in period 1, i.e., $\frac{\partial D_{1,post}^l}{\partial \phi} = 0$.

Additionally, we can also show that when outflow controls are imposed only ex post, they

need to be stronger to accomplish the same reduction on capital flight in period 2. Consider, for example, the minimum level of ϕ needed to have $\pi^i_{run} \leq 0$ for all i, i.e., no capital outflow. That is, $\phi_{\min} = \frac{P_2 - P_1}{P_2}$. When ϕ is announced ex ante,

$$\phi_{\min,ex-ante} = \frac{\beta - 1}{\bar{\omega} + \beta}. \tag{25}$$

In contrast, if ϕ is announced ex-post, then

$$\phi_{\min,ex-post} = \frac{(\beta - 1)\,\bar{\eta}}{\bar{\omega}\bar{\eta} - (\bar{\omega} - 1\,)\,(\beta - 1) + \beta\bar{\eta}} \tag{26}$$

Assume now for the sake of exposition, $\bar{\omega} = 2$, $\beta = 2$, and $\bar{\eta} = 0.5$. Then, $\phi_{\min,ex-ante} = 0.25$ while $\phi_{\min,ex-post} = 0.5$. So the ex-post capital outflow tax needs to be twice as large as its ex-ante implementation to fully prevent any capital flight. Again, the reason why preemptive outflow controls can be more effective than outflow controls for this specific purpose is that they can deter looting behavior in period 1.

4.2 Domestic Regulation

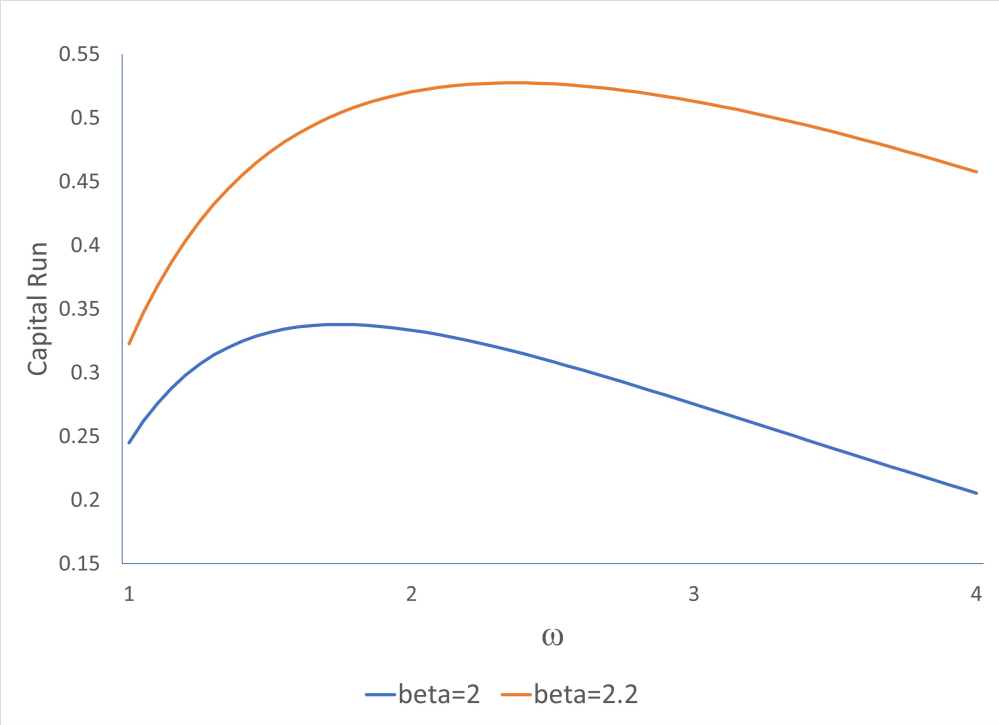
We now examine how domestic regulation affects asset price dynamics and equilibrium looting in period 1 as well as how it interacts with outflow controls.

4.2.1 Non-monotonic impact of domestic regulation

According to (19), a higher $\bar{\omega}$ can reduce the mass of looting $\tilde{D}^l_1$. In the first branch of (19), a higher $\bar{\omega}$ reduces the value of $\frac{1}{\bar{\omega}}$ directly. In the second branch, $\frac{\bar{\eta} - (\bar{\omega} - 1\,)\phi}{\bar{\omega}\bar{\eta} - (\bar{\omega} - 1\,)(\beta - \beta\phi - 1)}$ declines monotonically with a higher $\bar{\omega}$ as well. In the third branch, an increased $\bar{\omega}$ will make the boundary condition of $\bar{\omega} \leq 1$ less likely to hold. So both domestic regulation and outflow controls can reduce looting in period 1. Higher $\bar{\omega}$ can also reduce the minimum ϕ needed to halt capital flight altogether. According to (25), in fact, $\phi_{\min,ex-ante}$ declines with $\bar{\omega}$.

However, in cases in which a positive mass of looters runs away (i.e., $\phi < \phi_{\min,ex-ante}$), a higher $\bar{\omega}$ can also push more looters to run. Based on (36) in the Appendix, the share of looters who loot and run is $\tilde{\Omega}_{run}$. To see this, consider the following numerical example in

Figure 2: Equilibium Share of Running Looters and Domestic Regulation



Note. The x-axis plots $\bar{\omega}$, the maximum value of domestic penalty. The y-axis plots Ω_{stay} as in Appendix A, i.e., the percentage of looters who run away from the country. The blue line is for $\beta = 2$, while the red line is for $\beta = 2.2$.

which we set $\beta = 2$ as before, $\bar{\eta} = 1$, so that no looters have negative profit from running away, and $\phi = 0.1$. Figure 2 (bottom-blue line) plots $\tilde{\Omega}_{run}$ as a function of $\bar{\omega}$, varying it from 1 to 4. As $\bar{\omega}$ increases, the mass of looters running away initially increases, as $\bar{\omega}$ makes running away more attractive than staying through equation (19). As $\bar{\omega}$ increases further, however, the effect of a smaller mass of looters in period 1 starts to dominate, reducing the share of looters that run away.

This inverted U-shape relationship depends on the assumed $\beta = 2.2$. If the sensitivity of retail investors to asset price changes, for example, setting $\beta = 2.2$, the top (orange) line in Figure 2 shows that, for a given $\bar{\omega}$, the equilibrium share of looters that run away is larger than in the case of $\beta = 2$. This is intuitive as a higher β increases the mass of looters in period 1 and hence more looters will loot and run in period 2. Interestingly, the parameter region where higher $\bar{\omega}$ leads to more running away also expands. This is intuitive. Based

on (18), for $\pi^i_{stay} < \pi^i_{run}$, the condition is $\frac{P_2\phi+\eta_i}{P_2-P_1} < \omega_i$. In equilibrium, $\frac{P_2\phi+\eta_i}{P_2-P_1} = \frac{\left(\tilde{D}^l_1\beta+1\right)\phi+\eta_i}{\tilde{D}^l_1(\beta-1)}$, which declines with β. Hence as β increases, given ω_i and η_i, a looter is more likely to run away than to stay. Therefore, higher β expands the region where higher $\bar{\omega}$ causes more capital flight.

The inverted U-shape impact of domestic regulation on capital flight suggests that in some regions, higher domestic penalties may add rather than alleviate the pressure on the foreign exchange market—a result that echoes the argument in favor of "congruent financial regulation" in Metrick and Tarullo (2021) according to which policymakers need to consider the unintended effects of regulating one market on other markets.

4.2.2 Homogeneous domestic regulation

So far we assumed that due to government institutional weaknesses, the realized penalty ω_i varies across individual looters. What happens if $\omega_i = \bar{\omega}$ can be made homogenous and all looters face the same penalty? When $\omega_i = \bar{\omega}$ for all i, we have the mass of looting at period 1 is given by

$$\tilde{D}^l_{1|\omega_i=\bar{\omega}} = \left\{ \begin{array}{c} 0 \text{ if } \ \phi \geq \frac{\beta-1-\eta}{\beta+1} \text{ and } \bar{\omega} \geq 1 \\ 1\text{if } \phi < \frac{\beta-1-\eta}{\beta+1} \text{ and } \bar{\omega} \geq 1 \\ 1 \text{ if } \bar{\omega} < 1 \end{array} \right\}. \tag{27}$$

According to the decision rule in (27), a higher ϕ may still decrease $\tilde{D}^l_{1|\omega_i=\bar{\omega}}$ by affecting the boundary conditions. Moreover, compared with $\tilde{D}^l_1$, the mass of looting in period 1 $\tilde{D}^l_{1|\omega_i=\bar{\omega}}$ has a lower value. For example, if $\beta = 2$, $\bar{\omega} = 1.1$, $\eta = 1.1$, and $\phi = 0.1$, then $\tilde{D}^l_{1|\omega_i=\bar{\omega}} = 0$ compared with $\tilde{D}^l_1 = 0.96$ with heterogenous penalty. A more effective implementation of government regulation helps to curtail looting and reduce the need for outflow controls in this setting. This is consistent with our earlier observation that government effectiveness is associated with the prevalence of controls on capital outflows of residents.

4.2.3 No capital outflow controls (Domestic regulation alone)

We now examine what happens to $\tilde{D}_1^l$ if there is no capital control tax, i.e., $\phi = 0$. As we noted earlier, from (20), given $\phi = 0$, we would have

$$\tilde{D}^l_{1|\phi=0} = \left\{ \begin{array}{c} \frac{\bar{\eta}}{\bar{\omega}\bar{\eta}-(\bar{\omega}-1\ )(\beta-1)} \text{ if } \quad \bar{\omega} > 1 \text{ and } \bar{\eta} > (\beta-1) \\ 1 \text{ if } \bar{\omega} \leq 1 \text{ or } \bar{\eta} \leq (\beta-1) \end{array} \right\}. \tag{28}$$

Assume for example that $\bar{\omega} > 1$ and $\bar{\eta} > (\beta - 1)$, so that regulation drives the profit of looting-and-staying negative and the maximum relocation cost to run away is large enough so that some looters may not loot in period 1. Let's now compare equilibrium looting in period 1 in this case, denoted $\tilde{D}^l_{1|\phi=0}$, with the case in which there is an outflow control tax large enough so that there is no capital run, i.e., $\tilde{D}_1^l$ conditional on $\phi \geq \frac{\beta-1}{\bar{\omega}+\beta}$.

We have

$$\frac{\tilde{D}^l_{1|\phi=0}}{\tilde{D}^l_{1|\phi\geq\frac{\beta-1}{\bar{\omega}+\beta}}} = \frac{\bar{\omega}\bar{\eta}}{\bar{\omega}\bar{\eta} - (\bar{\omega}-1\ )(\beta-1)}. \tag{29}$$

We can now see that either higher β or smaller $\bar{\eta}$ is associated with a higher $\tilde{D}^l_{1|\phi=0}$ relative to $\tilde{D}^l_{1|\phi\geq\frac{\beta-1}{\bar{\omega}+\beta}}$. And this ratio does not converge to 1 even with a very large $\bar{\omega}$. In fact, when $\bar{\omega} \to \infty$, we have $\frac{\tilde{\mathbf{D}}^l_{1|\phi=0}}{\tilde{\mathbf{D}}^l_{1|\phi\geq\frac{\beta-1}{\bar{\omega}+\beta}}} \to \frac{\bar{\eta}}{\bar{\eta}-(\beta-1)}$. For example, if $\beta = 2$ and $\bar{\eta} = 1.1$, then $\frac{\tilde{\mathbf{D}}^l_{1|\phi=0}}{\tilde{\mathbf{D}}^l_{1|\phi\geq\frac{\beta-1}{\bar{\omega}+\beta}}} \to 11$ as $\bar{\omega} \to \infty$, showing that the mass of looters in period 1 with $\phi = 0$ can be 10 times larger than that with a modest ϕ. In fact, when $\bar{\omega} \to \infty$, $\frac{\beta-1}{\bar{\omega}+\beta} \to 0$, even slightly above 0 ϕ can reduce the mass of speculation by 10 times.

We conclude from this analysis that a combination of capital outflow controls and domestic regulation can be more effective than domestic regulation alone in curtailing looting and speculation in period 1.

4.3 Optimal Outflow Controls

We now discuss the optimal level of the outflow control tax rate from the perspective of the government.

Consider the following simple social welfare function:

$$\Psi = (\min[P_t] - \max[P_t]) - c\phi. \tag{30}$$

The first component, $(\max[p_t] - \min[p_t])$, captures the idea that a asset price volatility is welfare reducing in an exchange economy. A microeconomic justification for this component can be the assumption that all market participants have constant absolute risk aversion utility over asset returns, as in Brunnermeier, Sockin, and Xiong (2022). In this setting, asset trading is a zero-sum game among market participants, and asset price volatility reduces the overall welfare.

Based on equations (6) and (21), we have that $\min[P_t]$ is $\hat{P}_0$, and $\max[P_t]$ is $\tilde{P}_2$. Hence,

$$(\min[P_t] - \max[P_t]) = -\beta \tilde{D}_1^l. \tag{31}$$

As $\frac{\partial \tilde{D}_1^l}{\partial \phi} \leq 0$, the government will have incentive to increase ϕ to reduce the price volatility.

The second component of the welfare function, $-c\phi$, captures the economic losses stemming from a higher ϕ. These can originate from the losses of risk-sharing and diversification opportunities as well as possibly superior and safer investment opportunities available abroad when other traders not engaged in looting are prevented from moving capital freely abroad.

The government will then pick a value of $\tilde{\phi}$ that maximize Ψ. The optimal value depends on the parameters of β, $\bar{\omega}$, $\bar{\eta}$ and c. As higher β increases the equilibrium mass of looters, the government will need to set a higher value of $\tilde{\phi}$ to maximize the social welfare.

5 Extensions

The model has a number of additional implications that we discuss in this section, referring the reader to Appendix C for more details.

First, in our baseline case, we focus on the impact of preemptive capital flow management (CFM) on resident outflows, specifically its role in preventing looting and containing asset price volatility. As in other capital control models, preemptive controls on inflows can also potentially mitigate asset price volatility, as in several of the papers briefly reviewed in the

introduction—see also the IMF (2022) survey. In Appendix C.1, we provide an example in which the naïve traders in our baseline model are interpreted as international traders. In this scenario, preemptive CFM on inflows complements CFM on outflows, leading to a reduction in initial looting, subsequent price boom and bust, and capital flight.

Second, in our setting outflow pressures in the FX market are captured by the share of looters who run away. In Appendix C.2, we analyze more explicitly how looters' capital flight affects the foreign exchange market. Our findings suggest that preemptive CFM on outflows can also help to stabilize fluctuations in the foreign exchange market in the presence of the distortions we focused on. As for other model properties, these effects can be further amplified by higher sensitivity of feedback-traders to price changes in the foreign exchange market. As a prospective avenue of future research, one can also further explore the inclusion of the same group of naive traders in both the domestic asset market and the FX currency market. This could open up avenues for generating feedback loops between domestic markets and FX markets. For instance, during a downturn of the domestic market, local currency may depreciate due to capital outflows. Consequently, the same group of naive traders may respond by selling domestic assets and buying foreign currency, thereby establishing a reinforcing cycle between these two types of trading activities. In this context, preemptive CFMs on outflows can yield two complementary effects. First, they can cool down the rapid devaluation of the domestic currency. Second, they can effectively disrupt the feedback loop between a crash in the domestic asset market and a depreciation of the FX market. By addressing both doom-loops, outflow controls can contribute to enhancing overall financial stability.

Third, in the baseline model, we demonstrate that preemptive controls can be more effective than ex post ones, as the former directly impacts looting during the initial period. In general, when a government issues preemptive announcements, it also signals its commitment to deterring looting.[15] To incorporate this effect into our model, we introduce a cost of spreading information about looting, or lobbying for more permissive regulation on looting,

[15]The literature has suggested that a government may use current capital control policies to signal future policies (e.g., Bartolini and Drazen (1997), Clayton et al. (2022)). For instance, Bartolini and Drazen (1997) present a model where a policy of liberalizing capital outflows signals the government's positive attitudes towards taxation of capitals, which may increase capital inflows.

denoted C. Specifically, the profit become: $\pi^i_{stay} = (P_2 - P_1)(1 - \omega_i) - C * 1\{\text{preannounced}\}$, and $\pi^i_{run} = (P_2(1-\phi) - P_1) - \eta_i - C * 1\{\text{preannounced}\}$. $1\{\text{preannounced}\}$ is a dummy variable that equals 1 if the government indicates its determination to deter looting through preannouncements, such as preemptive CFMs. When the government demonstrates its commitment to deterring looting, looters may incur additional expenses, such as lobbying the media to manipulate the sentiment of naïve investors. These additional costs reduce the profitability of looting, thus limiting the extent of initial looting.

Fourth, in the baseline model, we initially fixed the supply of the asset. This simplification was chosen in line with our objective of examining excess market volatility. However, it is possible to consider endogenous asset supply that introduces real economic factors into the analysis, such as production, investment, or employment. Indeed, countries may implement CFMs to alleviate both real and financial fluctuations. By extending the model to the real side, we could also incorporate real frictions, such as wage rigidity as discussed in Schmitt-Grohe and Uribe (2016), demand externalities as in Davila and Korinek (2018), and labor immobility across sectors as in Jeanne (2022). Introducing endogenous supply and real investment is left as an area of future research.

6 Looting Prevalence and Outflow Control Effectiveness

In this section, we discuss the quantitative relevance of financial looting underlying our theory, and investigate the extent to which countries with more stringent policies in place on resident outflows are less vulnerable to it. We first review available anecdotal and suggestive evidence of financial looting and then attempt to assess the scope for outflow controls in curtailing it in a fully specified empirical model.

6.1 How salient is financial looting?

How prevalent is the type of speculation and looting of our model, regardless of whether or not countries have the institutional capacity to combat it with domestic policy instruments, to motivate the use of costly preemptive controls on capital outflows of residents to contain its costs? Although the evidence is anecdotal, it is abundant. In a series of case studies

on the Savings&Loans Crisis in United States and other well-known boom-bust episodes in developing countries, AR document that finacial looting was pervasive in the 1980s and the 1990s. Subsequent notable examples are the Southeast and East Asian asset bubble prior to 1998 that was ultimately rooted in major failures of corporate governance and banking regulation (e.g., Quigley 2001 and Collyns and Senhadji 2002). The Subprime mortgage crisis in the late 2000s and the Crypto debacles the early 2020s in the United States vividly illustrate that the problem is acutely present even in the most advanced and institutionally developed economy of the world.

A specific example is the recent real estate boom in China. During China's 2000-2020 real estate boom, one can observe developers who engage in real estate speculation by unlawfully borrowing from banks, fitting the description of AR's looters. According to Reuters (4/16/2021), property purchases in China "funded through bank loans fraudulently obtained by speculators" were fuelling the real estate markets in 2020, with the amount (of misused loans) arguably to the tune of hundreds of billions of yuan. Some speculators resold the properties at higher prices, while others set up shell companies and used the properties as collaterals to get more business loans for further speculation. As frenzied speculation pushed up property prices, ordinary households poured their life savings into properties, with the expectation that house prices would keep rising (Financial Times 1/5/2023). Regulators eventually ordered a crackdown on illegal property loans (SCMP 1/31/2021). Banks also asked "the borrowers found to have misused the loans to buy homes to repay the money immediately" (SCMP 3/20/2021). Meanwhile, regulators strengthened the supervision of the forex market, and cracked down on deceptive forex transactions such as fraudulent trade invoicing and outbound investments (SCMP 12/1/2021, Reuters 9/29/2022). In February 2021, in some large cities, the trade volume of properties dropped by up to 60 percent, and prices declined by up to 8 percent (SCMP 3/20/2021).

Which portion of total capital outflows may be represented by flows driven by looting leaving the country legally or illegally to evade domestic penalties as opposed to normal economic diversification or precautionary acquisition of liquidity buffers in foreign currency? Available evidence suggests that the magnitude of illicit financial flows is substantial, posing

particular harm to saving-poor countries.[16] For instance, a study conducted by Alstadsæter et al. (2022) highlights that certain conflict-ridden countries and autocracies possess substantial real estate holdings in Dubai, amounting to 5 to 10 percent of their GDP. Moreover, Alstadsæter, Johannesen, and Zucman (2018) report that approximately 10 percent of the global GDP is held in tax havens, with significant variations observed across regions. Gulf countries and certain Latin American economies, in particular, exhibit proportions as high as 60 percent of their GDP being held in tax havens. Another concerning trend identified by Andersen, Johannesen, and Rijkers (2022) reveals a correlation between aid disbursements to poor countries and significant increases in bank deposits in offshore financial centers known for their practices of bank secrecy and private wealth management. Their findings indicate that approximately 7.5 percent of the aid provided is redirected to offshore bank accounts. Although this anecdotal evidence is only indirectly related to the specific channel at work in our model, it suggests the need to take the level of institutional development while designing capital account policy.

6.2 Can restrictions on resident capital outflows help contain financial looting?

In the empirical analysis, our focus revolves around understanding the ability of capital controls on resident outflows to contain financial looting. Following Andersen, Johannesen, and Rijkers (2022), who study the diversion of foreign aid flows by examining offshore bank accounts of countries receiving official aid, we first document that higher real house prices are associated with higher off-shore deposit in countries with more secretive banking systems (haven deposits). We then show that such flows are lower the tighter the controls on resident outflows.

The specification is as follows:

$$\Delta \ln (Haven_{i,t}) = \lambda \Delta \ln (RHP_{i,t}) + \gamma \Delta \ln (RHP_{i,t}) * CFM_{i,t} + \delta CFM_{i,t} + u_i + \varepsilon_{it}, \tag{32}$$

where $Haven_{i,t}$ reflects the stock of haven deposits owned by country i at year t. In Andersen et al. (2022), "Haven deposits" refer to off-shore deposits in countries such as Switzerland,

[16] See Brandt (2023) for a survey.

Luxembourg, Cayman Islands, Belgium, and Singapore, where the legal framework is more lenient toward secrecy and asset protection. $\Delta \ln (Haven_{i,t})$ is the annual change of the log of $Haven_{i,t}$. $RHP_{i,t}$ is a real housing price index in country i at year t. $\Delta \ln (RHP_{i,t})$ reflects the annual change of the log of $RHP_{i,t}$. $CFM_{i,t}$ is the capital outflow controls *on residents* in country i at year t.

The real housing price indices are the historical quarterly series in Cesa-Bianchi, Cespedes, and Rebucci (2015) till 2012, updated with BIS data from the residential property database. Off-shore deposits are from Andersen et al. (2022), based on BIS Locational banking statistics for cross-border deposits. Capital controls data are from Fernandez et al. (2015). The specific indicator of restrictions on resident outflows is calculated as follows. We first sum over the restrictions on residents' foreign purchases across various assets, including equities, bonds, money market instruments, collective investments, derivatives, and real estate. We then log this sum to facilitate the creation of the capital control index on resident outflows. Our sample covers 64 countries spanning from 1984 to 2018. Our analysis is implemented at the annual frequency, at which we have the capital control data, and also to mitigate data noise.

Our model predicts that $\lambda > 0$ if looters move profits abroad to haven countries after the housing market boom. Our model also predicts that $\gamma < 0$, as the capital flight of looters can be deterred by capital control measures.

Table 1: Impact of Housing Market on Offshore Bank Deposits

	(1)	(2)
	Haven	Non-Haven
Housing Price Movement	0.40***	0.26**
	[0.13]	[0.13]
Housing Price Movement*Capital Control	-0.21**	-0.085
	[0.097]	[0.10]
Capital Control	-0.036**	-0.023
	[0.018]	[0.018]
Country fixed effects	Yes	Yes
Observations	1,403	1,403
R-squared	0.041	0.031

Standard errors in brackets. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

The results are presented in Table 1. The estimation results reveal a significant association between higher housing prices and increased outflows to banks in haven countries (See Column 1 of Table 1). In the absence of capital controls, a one percent increase in housing prices corresponds to a 0.4 percent increase in deposit outflows to haven countries. However, this outflow is significantly tempered when a country implements capital controls on resident outflows, as evidenced from the significantly negative coefficient for housing price movement interacted with capital control. Moreover, in countries with the strictest capital outflow restrictions (with a capital control value of 1.95), housing price increases exhibit minimal impact on deposit outflows to haven countries. This illustrates the potential impact of capital controls in deterring capital outflows to these jurisdictions.

In Column 2, we examine the deposit flows to non-haven countries. There the influence of housing price on deposit outflows is less pronounced. Additionally, the interaction term of housing price movement with capital controls on resident outflows exhibits an insignificant coefficient. This suggests that the interplay between housing prices and capital controls has a weaker effect on deposit flows into non-haven countries.

7 Conclusions

In all institutional environments, including the United States, financial market regulation is as (im)perfect as markets are. In developing countries, in which institutions are weaker, domestic financial regulation and its implementation are weaker. This paper proposes a theory in which preemptive controls on capital outflows of residents (also called preemptive capital outflow management measures or CFMs) complement domestic regulation in minimizing asset price volatility and boom-bust cycles in domestic capital markets.

In this setting, retail uninformed, naïve investors engage in positive feedback or momentum trading, while heterogeneous speculators called looters exploit naïve traders by "pumping and dumping" an asset in fixed supply, taking into account the regulatory regime: an individual-specific penalty, a cost to circumvent outflow controls, and a heterogeneous cost to relocate abroad.

In equilibrium, preemptive controls on resident outflows reduce capital flight through

two channels: (i) by making capital flight less profitable than staying in the country, and (ii) by curtailing speculation and financial looting ex-ante. Compared to ex-post outflow CFMs, preemptive outflow controls are more effective because they not only limit capital flight ex-post, but also reduce speculative activity ex-ante. The stabilizing effect of such controls is stronger the more sensitive naive traders are to asset price changes.

The paper also reviews anecdotal evidence on the prevalence of financial looting and its importance in illicit financial flows. Finally, the paper provides suggestive empirical evidence that higher housing prices are associated with increased deposit outflows to banks in countries with stricter secrecy laws. However, this association is significantly tempered when a country implements capital controls on resident outflows, which is consistent with the predictions of our model.

We also show that the impact of domestic regulation on speculation and capital flight is non-monotonic, displaying an inverted U-shaped impact on capital flight. In certain parameter regions, domestic regulation increases capital flight rather than decreasing it. This effect is more pronounced when naive investors are more sensitive to changes in asset prices. This finding speaks to the desirability or necessity to coordinate domestic financial regulation and capital account policy to minimize any unintended negative consequences on domestic asset markets.

The analysis in the paper acknowledges the costs of implementing outflow controls on residents, including missed diversification opportunities, the foregone liquidity provision benefits of repatriating capital outflows during crises, and the likely negative repercussions on inflows in capital-scarce economies. However, the article contends that preemptive controls on resident outflows can help mitigate speculative activity in weakly regulated domestic markets. This, in turn, can alleviate the burden on domestic regulation and potentially create more policy space to support legitimate outflows. Furthermore, preemptive controls on resident outflows could attract foreign investment by stabilizing domestic markets, especially in situations where informational disadvantages exist for foreign investors. Developing a more comprehensive theory of outflow and inflow controls, based on both government failure in designing effective domestic financial regulation and explicit costs associated with restricting capital mobility, represents a promising avenue for future research.

A Appendix: Looters' Mass and Boundaries Conditions

1.1 No Looting

Potential looters will not enter the market if their maximum profits from stay or run is negative, i.e., if $Max\left[\pi^i_{stay}, \pi^i_{run}\right] \leq 0$. This can occur in the following two scenarios: i) $\frac{P_2\phi+\eta_i}{P_2-P_1} < \omega_i$ but $(P_2(1-\phi)-P_1) \leq \eta_i$, resulting in $\pi^i_{stay} < \pi^i_{run} \leq 0$; ii) $\omega_i < \left(\phi + \frac{P_1\phi+\eta_i}{P_2-P_1}\right)$ but $\omega_i \geq 1$, resulting in $\pi^i_{run} < \pi^i_{stay} \leq 0$.

Aggregating over these two scenarios, the portion of no speculation, Ω_{no}, will be the following:

Case 1 (large $\bar{\omega}$ and $\bar{\eta}$ with a small ϕ). In this case, $\bar{\omega} \geq 1$, $\bar{\eta} \geq (P_2(1-\phi)-P_1)$, and $P_2(1-\phi) \geq P_1$. Here some looters will have a negative profit by loot-and-stay, while others will have a negative profit by loot-and-run. A potential looter will not loot if π_{stay} and π_{run} are both non positive. Given the independent distributions of ω_i and η_i, the share of no looting is thus given by

$$\Omega_{no} = \frac{(\bar{\omega}-1)(\bar{\eta}-(P_2(1-\phi)-P_1))}{\bar{\omega}\bar{\eta}}. \tag{33}$$

Case 2 (large $\bar{\omega}$ and $\bar{\eta}$ with a large ϕ). In this case, $\bar{\omega} \geq 1$, $\bar{\eta} \geq (P_2(1-\phi)-P_1)$, and $P_2(1-\phi) < P_1$. Here no looter will make positive profits from run due to high tax on capital outflows. Then whether a looter will loot depends on whether he could make a positive profit by stay. Given the distribution of ω_i, the share of no looting is thus given by

$$\Omega_{no} = \frac{(\bar{\omega}-1)}{\bar{\omega}}. \tag{34}$$

Case 3 (small $\bar{\omega}$ or small $\bar{\eta}$). In this case, $\bar{\omega} < 1$ or $\bar{\eta} < (P_2(1-\phi)-P_1)$. Here every potential looter can make a positive profit by stay or run. Hence the share of no looting is

$$\Omega_{no} = 0. \tag{35}$$

When $\bar{\omega} < 1$, it will be always profitable to loot-and-stay, hence $\Omega_{no} = 0$. Similarly, when $\bar{\eta} < (P_2(1-\phi)-P_1)$, it will always be profitable to loot-and-run, hence again $\Omega_{no} = 0$.

1.2 Looting and Running Away

Potential looters will loot and run from the country if and only if the following two conditions are met simultaneously: (i) $\frac{P_2\phi+\eta_i}{P_2-P_1} < \omega_i$, so that $\pi^i_{stay} < \pi^i_{run}$; and (ii) $(P_2(1-\phi)-P_1) > \eta_i$, so that $\pi^i_{run} > 0$. Aggregating over these ranges of parameters, we have the portion of loot-and-run as the following:

Case 1 (large $\bar{\omega}$ and small ϕ). In this case, $\frac{P_2\phi}{P_2-P_1} < \bar{\omega}$ and $P_1 < P_2(1-\phi)$. Here the maximum penalty for looting is large enough that for some looters, it will be more profitable to run than stay. Moreover, the condition of $P_1 < P_2(1-\phi)$ ensures that some looters can make positive profits from run. The share of looters choosing to run is thus given by

$$\Omega_{run} = \int_0^{Min[\bar{\omega}(P_2-P_1)-\phi P_2,(P_2(1-\phi)-P_1),\bar{\eta}]} \int_{\frac{P_2\phi+\eta_i}{P_2-P_1}}^{\bar{\omega}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta. \tag{36}$$

In (36), we first integrate ω_i from $\frac{P_2\phi+\eta_i}{P_2-P_1}$ to $\bar{\omega}$, which is the region where $\pi^i_{run} \geq \pi^i_{stay}$ given η_i. We then integrate η_i from 0 to the minimum of $(\bar{\omega}(P_2-P_1)-\phi P_2)$, $(P_2(1-\phi)-P_1)$, and $\bar{\eta}$. The threshold of $(\bar{\omega}(P_2-P_1)-\phi P_2)$ for η_i ensures that ω_i is not integrated above $\bar{\omega}$. And the threshold of $(P_2(1-\phi)-P_1)$ for η_i ensures that there is a positive profit from running.

Case 2 (small $\bar{\omega}$, or large ϕ). In this case, $\frac{P_2\phi}{P_2-P_1} \geq \bar{\omega}$ or $P_1 \geq P_2(1-\phi)$. When $\frac{P_2\phi}{P_2-P_1} > \bar{\omega}$, it would always be more profitable to stay than run. And if $P_1 \geq P_2(1-\phi)$, there is no positive profitable from run. Hence,

$$\Omega_{run} = 0. \tag{37}$$

1.3 Looting and Staying

For looter i to stay, we need $\pi^i_{stay} \geq \pi^i_{run}$ and $\pi^i_{stay} > 0$, which in turn require $\omega_i \leq \frac{P_2\phi+\eta_i}{P_2-P_1}$ and $\omega_i < 1$, respectively.

To determine the share of looters who chose to stay, Ω_{stay}, we need to aggregate over the relevant boundaries of the parameter space. There are several cases, depending on the upper bounds of the distributions, $\bar{\omega}$ and $\bar{\eta}$.

Case 1 (Large $\bar{\omega}$ and $\bar{\eta}$). In this case, $\bar{\omega} > 1$ and $0 < (P_2(1-\phi)-P_1) < \bar{\eta}$. Here both

the maximum penalty for looting and the maximum cost of running away are large enough to potentially drive the profits from staying or running away below zero. In particular, $\pi^i_{run} > 0$ when $\eta_i < (P_2(1-\phi) - P_1)$, and $\pi^i_{run} \leq 0$ when $(P_2(1-\phi) - P_1) \leq \eta_i)$. The share of looters choosing to stay is thus given by

$$\Omega_{stay} = \int_0^{P_2(1-\phi)-P_1} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta + \int_{P_2(1-\phi)-P_1}^{\bar{\eta}} \int_0^1 \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta, \tag{38}$$

where the first element in the sum captures the region of the parameter space in which $\pi^i_{run} > 0$ but $\pi^i_{stay} \geq \pi^i_{run}$, while the second element captures the region in which $\pi^i_{run} \leq 0$ and $\pi^i_{stay} > 0$.

Case 2 (Large $\bar{\omega}$, small $\bar{\eta}$). In this case, $\bar{\omega} > 1$ and $0 < \bar{\eta} \leq (P_2(1-\phi) - P_1)$. Here the maximum cost of running away is small enough such that the profit from running away is non-negative. But the maximum penalty for looting is still large enough to potentially drive the profits from staying below zero. The share of looters choosing to stay is thus given by

$$\Omega_{stay} = \int_0^{\bar{\eta}} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta. \tag{39}$$

The integration captures the parameter region in which $\pi^i_{run} \geq 0$ but $\pi^i_{stay} \geq \pi^i_{run}$.

Case 3 (Small $\bar{\omega}$, large $\bar{\eta}$). In this case, $\bar{\omega} \leq 1$ but $0 < (P_2(1-\phi) - P_1) < \bar{\eta}$. Here the maximum penalty for looting is small enough such that the profit from staying is non-negative. But the maximum cost of running away is still large enough to potentially drive the profit from running away below zero. The share of looters choosing to stay is thus given by

(40)

$$\Omega_{stay} = \int_0^{\bar{\omega}(P_2-P_1)-\phi P_2} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta + \int_{\bar{\omega}(P_2-P_1)-\phi P_2}^{P_2(1-\phi)-P_1} \int_0^{\bar{\omega}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta + + \int_{P_2(1-\phi)-P_1}^{\bar{\eta}} \int_0^{\bar{\omega}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta.$$

The first element in the sum captures the parameter region in which $\pi^i_{run} > 0$, $\pi^i_{stay} \geq \pi^i_{run}$ and $\frac{P_2\phi+\eta_i}{P_2-P_1} \leq \bar{\omega}$. The second element captures the parameter region in which $\pi^i_{run} > 0$, $\pi^i_{stay} \geq \pi^i_{run}$ and $\frac{P_2\phi+\eta_i}{P_2-P_1} > \bar{\omega}$. The third element captures the region in which $\pi^i_{run} \leq 0$ and $\pi^i_{stay} > 0$.

Case 4 (small $\bar{\omega}$ and $\bar{\eta}$). In this case, $0 < \bar{\eta} \leq (P_2(1-\phi) - P_1)$ and $\bar{\omega} \leq 1$. Here both the maximum penalty for looting and the maximum cost of running away are small enough such that the profits from staying or running away is non-negative. The share of looters choosing to stay, Ω_{stay}, will depend on whether $\frac{P_2\phi+\bar{\eta}}{P_2-P_1} > \bar{\omega}$.

If $\frac{P_2\phi+\bar{\eta}}{P_2-P_1} \geq \bar{\omega}$, then

$$\Omega_{stay} = \int_0^{\bar{\omega}(P_2-P_1)-\phi P_2} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta + \int_{\bar{\omega}(P_2-P_1)-\phi P_2}^{\bar{\eta}} \int_0^{\bar{\omega}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta. \tag{41}$$

The first element of (41) captures the parameter region where $\pi^i_{run} \geq 0$, $\pi^i_{stay} \geq \pi^i_{run}$, and $\frac{P_2\phi+\eta_i}{P_2-P_1} \leq \bar{\omega}$. The second element of (38) captures the parameter region where $\pi^i_{run} \geq 0$, $\pi^i_{stay} \geq \pi^i_{run}$, and $\frac{P_2\phi+\eta_i}{P_2-P_1} > \bar{\omega}$.

But if $\frac{P_2\phi+\bar{\eta}}{P_2-P_1} < \bar{\omega}$, then

$$\Omega_{stay} = \int_0^{\bar{\eta}} \int_0^{\frac{P_2\phi+\eta_i}{P_2-P_1}} \frac{1}{\bar{\omega}\bar{\eta}} d\omega d\eta. \tag{42}$$

(42) captures the parameter region where $\pi^i_{run} \geq 0$, $\pi^i_{stay} \geq \pi^i_{run}$, and $\frac{P_2\phi+\eta_i}{P_2-P_1} < \bar{\omega}$.

Case 5 (large ϕ) In this case, $P_2(1-\phi) < P_1$. That is, the profit from running away is negative for all looters. In this situation, Ω_{stay} will simply depend on whether looting can be profitable or not if the looter stays. If $\bar{\omega} > 1$, we have

$$\Omega_{stay} = \frac{\bar{\omega}-1}{\bar{\omega}} . \tag{43}$$

But if $\bar{\omega} \leq 1$, we then have

$$\Omega_{stay} = 1. \tag{44}$$

In the last case, all looters will loot and stay.

B Appendix: Proof of Proposition 1

Consider first the case in which the capital control tax does not extract all profit from looters, and the penalty for looting and the transaction cost for running away can push the profit into negative territory, i.e., $P_2(1-\phi) \geq P_1$ and both $\bar{\omega} \geq 1$ and $\bar{\eta} \geq (P_2(1-\phi) - P_1)$. From Equation (**??**), we know that the mass of looters in period 1, D_1^l, this case is:

$$D_1^l = 1 - \Omega_{no} = \frac{\bar{\omega}\bar{\eta} - (\bar{\omega} - 1)(\bar{\eta} - (P_2(1-\phi) - P_1))}{\bar{\omega}\bar{\eta}}. \tag{45}$$

The equilibrium P_1, P_2 and D_1^l can now be determined jointly from equations (8), (10), (45), subject to $\bar{\omega} \geq 1$, $\bar{\eta} \geq (P_2(1-\phi) - P_1)$ and $P_2(1-\phi) \geq P_1$. To see this, assume without loss of generality that $(A - B) = 1$. Equation (8) simplifies to $P_1 = 1 + D_1^l$, while Equation (10) becomes $P_2 = 1 + \beta D_1^l$. Substituting P_1 from (8) and P_2 from (10) into the right hand side of D_1^l in (45), we have

$$D_1^l = \frac{\bar{\omega}\bar{\eta} - (\bar{\omega} - 1)\left(\bar{\eta} - \left(\left(1 + \beta D_1^l\right)(1-\phi) - \left(1 + D_1^l\right)\right)\right)}{\bar{\omega}\bar{\eta}}. \tag{46}$$

Solving the last expression for D_1^l, we find:

$$D_1^l = \frac{\bar{\eta} - (\bar{\omega} - 1)\phi}{(\bar{\omega}\bar{\eta} - (\bar{\omega} - 1)(\beta - 1) + (\bar{\omega} - 1)\beta\phi)}. \tag{47}$$

Last, we now need to ensure that the boundary conditions are satisfied. Thus, we are seeking parameter restrictions for which $\bar{\eta} \geq (P_2(1-\phi) - P_1)$ and $P_2(1-\phi) \geq P_1$. Note, first, that

$$(P_2(1-\phi) - P_1) = \left(1 + \beta D_1^l\right)(1-\phi) - \left(1 + D_1^l\right). \tag{48}$$

Substituting D_1^l from (47) into (48), and noticing that $P_2(1-\phi) > P_1$ requires $\phi < \frac{\beta - 1}{\beta + \bar{\omega}}$, we have that $\bar{\eta} \geq (P_2(1-\phi) - P_1)$ requires $\bar{\eta} \geq ((1+\beta)(1-\phi) - 2)$.

Next, consider the case in which the capital control tax can extract all profit from looters, but the penalty for looting and the transaction cost for running away can also push the profit

into negative territory, i.e., $P_2(1-\phi) < P_1$, $\bar{\omega} \geq 1$, and $\bar{\eta} \geq (P_2(1-\phi) - P_1)$.

If ϕ is large enough so that $P_1 > P_2(1-\phi)$, it is not profitable to run way even if $\eta_1 = 0$. Hence, the mass of looters is only made up of those who loot and stay, which is profitable only if $\omega_i < 1$. Thus, a fraction $\frac{(\bar{\omega}-1\ )}{\bar{\omega}}$, will not loot as in Equation (34), assuming that ω_i is uniformly distributed between $[0, \bar{\omega}]$. And, in this case, the mass of looters, D_1^l, will be $\frac{1}{\bar{\omega}}$.

Given $D_1^l = \frac{1}{\bar{\omega}}$, according to (8), the price at period 1, P_1, will be $1 + \frac{1}{\bar{\omega}}$. According to (10), the price at period 2, P_2, will be $1 + \frac{\beta}{\bar{\omega}}$. Denoting $\bar{\phi}$ the level of of the outflow tax rate such that $P_1 = P_2\left(1-\bar{\phi}\right)$, we have $\bar{\phi} = \frac{\beta-1}{\bar{\omega}+\beta}$. Therefore, if $\phi > \frac{\beta-1}{\bar{\omega}+\beta}$, then $P_1 > P_2(1-\phi)$, and $D_1^l = \frac{1}{\bar{\omega}}$ will be the equilibrium mass of speculation.

Consider last the case in which $\bar{\omega} < 1$ or $\bar{\eta} < (P_2(1-\phi) - P_1)$. If $(P_2(1-\phi) - P_1) > \bar{\eta}$, then it is always profitable to speculate and run, which then implies $D_1^l = 1$. With $D_1^l = 1$, $(P_2(1-\phi) - P_1)$ will be equal to $((1+\beta)(1-\phi) - 2)$. So if $\bar{\eta} < ((1+\beta)(1-\phi) - 2)$, then in the equilibrium $D_1^l = 1$. If $\bar{\omega} < 1$, then it will also always be profitable to speculate and stay, and the mass of speculation will be $D_1^l = 1$.

Combining all the boundary conditions, we then have:

(49)

$$\tilde{D}_1^l = \left\{ \begin{array}{c} \frac{1}{\bar{\omega}} \text{ if } \phi \geq \frac{\beta-1}{\bar{\omega}+\beta} \text{ and } \bar{\omega} > 1 \text{ and } \bar{\eta} > ((1+\beta)(1-\phi) - 2) \\ \frac{\bar{\eta} - (\bar{\omega}-1\ )\phi}{\bar{\omega}\bar{\eta} - (\bar{\omega}-1\ )(\beta - \beta\phi - 1)} \text{ if } \phi < \frac{\beta-1}{\bar{\omega}+\beta} \text{and } \bar{\omega} > 1 \text{ and } \bar{\eta} > ((1+\beta)(1-\phi) - 2) \\ 1 \text{ if } \bar{\omega} \leq 1 \text{ or } \bar{\eta} \leq ((1+\beta)(1-\phi) - 2) \end{array} \right\},$$

and

$$\tilde{P}_1 = 1 + \tilde{D}_1^l, \tag{50}$$

$$\tilde{P}_2 = 1 + \beta \tilde{D}_1^l. \tag{51}$$

Q.E.D.

C Appendix: Extensions

3.1 International Investors and Controls on Inflows

So far, we have assumed all naive investors are domestic residents. We now allow for the

possibility that some naive investors are international investors, and their entry into the domestic market can be affected by a tax on capital inflow.

From (2), the total demand by naive investors is $D_t^n = \beta (P_{t-1} - P_{t-2})$. As β increases, for given prices, D_t^n will increase as well. Furthermore, based on (19), the equilibrium level of speculation, $\tilde{\mathbf{D}}_1^l$, increases with β as well.

Assume now that

$$\beta = \beta_d + \beta_f (1 - \theta), \tag{52}$$

where β_d is the component related to domestic naive investors, β_f is the component related to foreign naive investors, and θ is a tax on capital inflow from naive foreign investors. With a higher θ, some naive foreign investors may stay out of the domestic asset market. As θ increases and β declines, $\tilde{\mathbf{D}}_1^l$ will go down. So taxes on capital inflow help curtailing the initial speculation. The equilibrium price $\tilde{P}_2$ will also decrease θ due to both less initial speculation and a smaller mass of naive investors in period 2 that push up the price. Note that as $\tilde{\mathbf{D}}_1^l$ drops, capital flight of looters, Ω_{run}, will also decrease in equilibrium. Hence, capital control on inflows reduces capital outflow by looters.

3.2 Foreign Exchange Market

Capital run by looters can cause the local currency to depreciate. However, the exchange rate could also depend on the composition of naive investors. If some naive investors are international investors as discussed in the above subsection, then their arrival may bring upward pressure to the exchange rate.

In this subsection, we will examine how preemptive capital control affects the currency market. We assume there are five periods for the currency market, for t from 0 to 4. And there are four types of participants: i) looters; ii) naive international investors; iii) unsophisticated domestic currency traders; iv) the central bank. We now illustrate the demand of each player and examine the equilibrium exchange rate.

Period 0

The demand of local currency by looters is denoted as Y_0^l. As the mass of looters is 1,

$Y_0^l = 1$ with no capital flight. The demand of local currency by naive international investors is denoted as Y_0^f. At period 0, $Y_0^f = 0$ as international investors have not entered the country yet.

Unsophisticated traders in the FX market behave akin to naive investors in the domestic asset market. Their demand of local currency at period t is

$$Y_t^m = \gamma \left(x_{t-1} - x_{t-2} \right), \tag{53}$$

where x_t is the exchange rate at period t. Higher x_t implies an appreciation of the local currency. Unsophisticated currency traders will buy/sell the local currency as it appreciates/depreciates.[17] In period 0, $Y_t^m = 0$ as there has been no prior change of the exchange rate.

The demand of the local currency by the central bank is denoted as Y_t^g. The central bank will buy the local currency as it depreciates and sell as it appreciates. We assume that

$$Y_t^g = h_0 - h_1 x_t. \tag{54}$$

Note that h_0 could reflect factors such as the difference of domestic and foreign interest rates. For the simplicity of exhibition, and without the loss of generality, we assume $h_1 = 1$.[18]

Assume the total supply of domestic currency is M. At each period, in equilibrium, we have

$$Y_t^l + Y_t^f + Y_t^m + Y_t^g = M. \tag{55}$$

In period 0, the equilibrium exchange rate is

$$x_0 = 1 + h_0 - M. \tag{56}$$

[17]Here the feedback trading is based on the previous change of the exchange rate. One can also model the feedback trading as based on the previous change of the foreign reserves of the central bank. In our model, as the central bank uses the foreign reserves to smooth out the market, the two approaches of feedback trading will generate similar qualitative results.

[18]For a recent discussion of central bank's intervention in the currency market, see "Big Asian economies take on the forces of international capital—and win" (The Economist, 2/25/2023)

Period 1

At period 1, naive international investors enter the currency market after observing an increase of P_t in the domestic asset market. According to (2), (6), (20), and (52), their demand for currency at period 1, Y_1^f, is [19]

$$Y_1^f = \beta_f (1-\theta) \tilde{D}_1^l. \tag{57}$$

Here β_f and θ are explained more as in Appendix C. Meanwhile, the demands of looters and unsophisticated traders remain the same as in Period 0. Hence the equilibrium exchange rate is

$$x_1 = x_0 + \beta_f (1-\theta) \tilde{D}_1^l. \tag{58}$$

At period 1, x increases by $\beta_f (1-\theta) \tilde{D}_1^l$, due to the purchase of the local currency by naive international investors.

Period 2

The demand of the local currency by looters, Y_2^l, equals $\left(1 - \tilde{\Omega}_{run}\right)$, due to the capital run. Note that Y_2^l includes the demand from potential looters who do not speculate, as well as the demand from looters who speculate but stay in the country. The demand of currency by naive international investors, Y_2^f, remains at $\beta_f (1-\theta) \tilde{D}_1^l$.

The demand of currency by unsophisticated traders is:

$$Y_2^m = \gamma \beta_f (1-\theta) \tilde{D}_1^l. \tag{59}$$

In the equilibrium,

$$x_2 = x_0 - \tilde{\Omega}_{run} + (1+\gamma) \beta_f (1-\theta) \tilde{D}_1^l. \tag{60}$$

Period 3

[19] We assume that naive international investors buy the local currency at the end of period 1 after they observe the price change of the domestic asset (P_t) so that they can buy the domestic asset in period 2. This could be the case by assuming that the FX market closes later than the domestic asset market.

At period 3, the demand of currency by looters, Y_3^l, remains at $\left(1-\tilde{\Omega}_{run}\right)$. Now international investors sell the domestic asset and exit the country. Their demand of the local currency will be $Y_3^f = 0$. The demand of currency by unsophisticated traders, Y_3^m, is $\gamma\left(\gamma\beta_f\left(1-\theta\right)\tilde{D}_1^l - \tilde{\Omega}_{run}\right)$. Hence the equilibrium exchange rate will be

$$x_3 = x_0 - \left(1+\gamma\right)\tilde{\Omega}_{run} + \gamma^2\beta_f\left(1-\theta\right)\tilde{D}_1^l. \tag{61}$$

Period 4

The demand of looters, Y_4^l, is still $\left(1-\tilde{\Omega}_{run}\right)$. And the demand of naive international investors is $Y_4^f = 0$. Moreover, the demand from unsophisticated trader, Y_4^m, is $\gamma\left(x_3 - x_2\right)$. Hence the equilibrium exchange rate will be

$$x_4 = x_0 - \left(1+\gamma^2\right)\tilde{\Omega}_{run} + \gamma\left(\gamma^2-\gamma-1\right)\beta_f\left(1-\theta\right)\tilde{D}_1^l. \tag{62}$$

We now look at the peak-to-trough change of x over the periods. We look at two cases where $\gamma = 0$ and $\gamma = 1$.

With $\gamma = 0$, the peak of x is x_1, at $x_0 + \beta_f\left(1-\theta\right)\tilde{D}_1^l$, and the minimum of x is x_4 at $x_0 - \tilde{\Omega}_{run}$. Then the peak-to-trough change of x is $\beta_f\left(1-\theta\right)\tilde{D}_1^l + \tilde{\Omega}_{run}$. A higher capital outflow tax ϕ or a higher capital inflow tax θ can reduce the peak-to-trough change by reducing both the initial speculation $\tilde{D}_1^l$ and the capital run $\tilde{\Omega}_{run}$.

With $\gamma = 1$, if $\beta_f\left(1-\theta\right)\tilde{D}_1^l > \tilde{\Omega}_{run}$, then the maximum of x is x_2. The minimum of x is x_4. Therefore, the peak-to-trough change of x is $3\beta_f\left(1-\theta\right)\tilde{D}_1^l + \tilde{\Omega}_{run}$. If $\beta_f\left(1-\theta\right)\tilde{D}_1^l < \tilde{\Omega}_{run}$, then the maximum of x is x_1, and the peak-to-trough change of x will be $2\beta_f\left(1-\theta\right)\tilde{D}_1^l + 2\tilde{\Omega}_{run}$. Again a higher ϕ or θ can reduce the peak-to-trough change by reducing both $\tilde{D}_1^l$ and $\tilde{\Omega}_{run}$. Moreover, compared with the case of $\gamma = 0$, now the peak-to-trough change of x is larger due to the trading by unsophisticated currency traders. And hence the preventive impact of ϕ or θ will be even more pronounced in reducing the swing of x.

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