BANK OF GREECE
EUROSYSTEM

Working Paper

Guaranteeing trade in a severe crisis: cash collateral over bank guarantees

Antonis Kotidis
Margaux MacDonald
Dimitris Malliaropulos

316

MARCH 2023

BANK OF GREECE
Economic Analysis and Research Department – Special Studies Division
21, E. Venizelos Avenue
GR-102 50 Athens
Tel: +30210-320 3610
Fax: +30210-320 2432

www.bankofgreece.gr

Published by the Bank of Greece, Athens, Greece

ISSN: 2654-1912 (online)
DOI: https://doi.org/10.52903/wp2023316

GUARANTEEING TRADE IN A SEVERE CRISIS: CASH COLLATERAL OVER BANK GUARANTEES

Antonis Kotidis
Board of Governors of the Federal Reserve System

Margaux MacDonald
International Monetary Fund

Dimitris Malliaropulos
Bank of Greece and University of Piraeus

Abstract

Banks guarantee international trade through letters of credit. This paper analyzes what happens to trade when the critical role of banks as trade guarantors is compromised. Using the case of the Greek capital controls in 2015, the events around which led to a massive loss of confidence in the domestic banking system, we show that firms whose operations were more dependent on domestic banks suffered a steep decline in imports and, subsequently, exports. This operated through letters of credit, which during the capital controls period had to be backed by firms' own cash collateral rather than the bank guarantee. As a result, cash-poor firms imported relatively less. Public intervention to guarantee transactions is shown to help mitigate some of the decline in imports.

JEL-Classifications: F14; F23; F34; G21
Keywords: Bank guarantee, letters of credit, imports, exports, capital control

Acknowledgements: The views expressed in this paper are those of the authors and do not necessarily reflect the position of the Federal Reserve System or its Board of Governors, the International Monetary Fund, its Executive Board, or IMF management, the Bank of Greece or the Eurosystem..

Correspondence:
Dimitrios Malliaropulos
Bank of Greece,
21 El. Venizelos Av.,
10250 Athens, Greece
Tel.:0030-210-3202380
Email: dmalliaropulos@bankofgreece.gr

1. Introduction

Banks play a critical role in facilitating international trade by providing tools for financing and risk mitigation. During a crisis, these functions can be both interrupted and amplified. For instance, balance sheet constraints of banks may reduce the availability of letters of credit, a common form of trade finance, and exacerbate demand-driven declines in imports and exports (Niepmann and Schmidt-Eisenlohr, 2017). At the same time, banks' risk mitigation functions become ever-more important and thus traded goods that rely more on letters of credit may be more resilient in times of crisis (Crozet, Demir and Javorcik, 2022). At the core of these relationships is banks' role as guarantors in trade. But what happens to trade when a crisis is so severe that banks' role as trade guarantors is wholly disabled?

This paper studies the impact on trade from banks' loss of status as trade guarantors, and specifically when the status loss is induced by the uncertainty stemming from capital controls. Our focus is on the case of Greece, which imposed a bank holiday and capital outflow controls on June 28, 2015, in order to avert a collapse of the banking system. The uncertainty induced by the controls was related to whether or not the combination of financial and political turmoil would lead Greece to exit the eurozone and adopt a new independent currency, which would then be promptly devalued. This would bring banks close to insolvency and, among other things, hurt their ability to guarantee trade transactions for foreign firms and foreign correspondent banks. From the domestic firm's perspective, both the capital controls themselves and the loss of bank guarantees raised the overall cost of importing. We estimate the extent to which this decreased trade.

Importantly, the loss of guarantor status of banks is not unique to the Greek case. Other periods of severe financial crisis have also seen a breakdown of trade finance stemming from banks' inability to guarantee transactions, and a subsequent significant decline in trade. This occurred in several countries during the Asian financial crisis (Indonesia, Thailand, and Korea), in Pakistan, and in Argentina during the 1990s and early 2000s (Auboin and Meier-Ewert, 2003). Looking forward, such a scenario could feasibly happen in any economy—developed or developing—if there is sufficient risk of loss of confidence in the banking system and significant capital outflows, currency devaluation,

or capital flow restrictions. Our paper is the first to estimate the impact on trade from banks' loss of status as trade guarantors.

Preview of the paper: In Greece, the capital control policy was designed to limit outflows of deposits from the domestic banking system in an effort to halt the rapid decline in bank assets and liabilities as central bank funding was frozen. While this affected all domestic deposit holders, importers were subject to particularly restrictive constraints. Firms who wished to import goods had to submit extensive documentation to a special central government committee responsible for examining all capital transfer requests, in order to justify the withdrawal of deposits from the banking system. The key element of this documentation was invoices from previous years' imports of similar goods, which provided proof to the special committee that the currency requested was for legitimate (or legitimate quantities of) imports. The examination of requests typically took several days or weeks before a decision to approve or reject was made, increasing significantly the cost of importing goods. An important novelty of our paper is access to this data at the firm level.

We begin by extracting this information from firms' applications to the special central government committee. In particular, we are interested in the total value of imports paid through the Greek banking system for each month in 2014, the year before the imposition of capital controls. We hand-collect these data for 120 large firms, which account for approximately 35% of imports and 30% of exports as of 2014. We then normalize by total assets to account for differences in firms' size. Since this information was required for all firms wishing to transfer funds abroad to pay for their imports, regardless of their payment method (cash in advance, open account or letter of credit), they provide a direct measure of firm-level exposure to capital outflow controls. After matching this information with customs data that report firm imports at the 5-digit product-level, we show that firms with higher ex-ante use of the domestic banking system for import-related payments reduced their imports relatively more during the period of capital controls. We further show that this decline in imports led to a decline in exports, due to the reliance on imported intermediate goods in the export industry. These results highlight our first important conclusion: that while capital outflow controls were important for the

stabilization of the banking system following the bank run and the freezing of central bank funding, they came at considerable cost to the real economy.

While all importing firms were affected by the capital controls, those who relied more heavily on bank trade finance in the form of letters of credit faced an additional burden. The imposition of capital controls followed by threats of a Greek exit from the euro system increased the prospect of a new, heavily devalued currency that would hurt bank balance sheets bringing banks close to insolvency. This brought a significant change to the their role as guarantors in trade: foreign correspondent banks, who were acting on behalf of foreign exporters, were no longer willing to accept the risk associated with Greek banks providing payment guarantees on behalf of Greek importers. This may have been, at least in part, because during the crisis the foreign banks' ability to adequately screen Greek banks was reduced (Ahn, 2020). Instead, foreign correspondent banks required full cash collateral in exchange for accepting a letter of credit issued by Greek banks. That is, Greek banks were no longer considered reliable guarantors of trade. The ultimate impact of this requirement was a rise in the cost of letters of credit for Greek importers, who now had to post cash as collateral in an amount equal to the value of the imported goods (in a convertible currency) prior to securing a letter of credit.

We provide evidence that shows that the reduction in overall trade during capital controls operated through firms who relied on letters of credit from domestic banks. These firms were relatively more adversely impacted by the capital controls-induced uncertainty, precisely because they could no longer rely on banks to be their guarantor and had to bear that cost themselves via cash collateral payments. To do this, we proceed in two steps. First, we combine firm-level balance sheet data with data from the Greek credit register, which provides firm-bank level loans and guarantees (inclusive of letters of credit). Using these data, we establish that firms with insufficient cash holdings to collateralize letters of credit were 15% less likely to secure new letters of credit after capital controls. Conditional on securing a new letter of credit, its value was halved relative to the pre-capital controls period. Through the inclusion of bank-quarter, firm-quarter and bank-firm fixed effects, our results are not contaminated by unobserved differences across banks, firms or bank-firm relationships. In a second step, we interact our direct firm-level measure of exposure to capital controls with our identifiers of firms who could not pledge sufficient cash

collateral for their letters of credit. We find that firms with similar levels of exposure to capital outflow controls (measured by their share of imports paid through the Greek banking system one year earlier) but had insufficient cash for collateral to back their letters of credit imported 63% less than those who had sufficient cash.

Finally, we study what happens when the government steps in to take on the role of guarantor of trade. We exploit a unique program by the European Bank for Reconstruction and Development (EBRD)—the Joint Trade Facilitation Programme—which went into effect in March 2016. Under this program the EBRD guaranteed payment under letters of credit issued by local Greek issuing banks to international confirming banks, taking on credit risk of non-payment by issuing banks. From a domestic firms' perspective, no cash collateral was required after the EBRD took on the role of trade guarantor hence the cost of trade decreased. We show that, economically, this program reversed the negative impact of capital controls supporting trade for those firms with relatively tighter cash constraints.

2. Related literature

Our findings relate to three strands of research in international and financial economics. First and most obvious is that of the role of banks as guarantors in international trade, largely led by Schmidt-Eisenlohr (2013) and Niepmann and Schmidt-Eisenlohr (2017) (see also Antras and Foley, 2015; Glady and Potin, 2011; Auboin and Meier-Ewert, 2003; Ahn, 2020), which identifies how and by whom letters of credit are used in international trade and how their use depends on risk levels. This literature is closely linked to a related set of papers that explore how bank funding shocks result in a reduction of the supply of letters of credit, which in turn affects trade (Niepmann and Schmidt-Eisenlohr, 2017; Ahn and Sarmiento, 2019; Demir, Michalski and Ors, 2017). At the core of this literature is banks' role as guarantors in trade. We contribute to this literature by documenting what happens to trade when this role is wholly disabled. Specifically, we document how heightened risk aversion (in this case stemming from a possible currency devaluation – Greece's exit from the Eurozone – that would bring domestic banks close to insolvency) affects trade via increasing the cost of trade finance—not necessarily from a traditional bank funding shock that reduces banks' supply of trade finance. We also

document how public intervention to guarantee transactions helps mitigate some of the effects on trade.

Our paper also relates to the literature on capital controls. Despite the increased use of capital controls by policymakers, empirical evidence is limited and much relies on annual macro-level data, which makes identifying channels through which capital controls function very difficult, if not impossible (see Ostry, Ghosh, Chamon and Qureshi, 2012; Forbes and Klein, 2015; Zeev, 2017; Edwards, 2007; Forbes, Fratzscher and Straub, 2015; Wei and Zhang, 2007; and references therein). Existing papers that use micro data to study the real effects of capital controls tend to focus on capital inflow controls—a crisis prevention, or prudential tool when applied ex-ante of a crisis—or use a more general dummy variable approach that doesn't distinguish between the types of capital controls (Forbes, Fratzscher, Kostka and Straub, 2016; Chamon and Garcia, 2016; Johnson and Mitton, 2003; Desai, Foley and Hines, 2006; Forbes, 2007; Alfaro, Chari and Kanczuk, 2017; Keller, 2018). Empirical studies on the real effects of capital outflow controls are scarce, and in some cases, contradictory. Cross-country panel data studies have found that capital outflow restrictions reduce the probability of a currency crisis (Eichengreen, Rose, and Wyplosz, 1994), do not reduce the probability of a currency crisis (Glick and Hutchison, 2000), or have no effect at all (Rossi, 1999). Others have found more nuanced results, for example that outflow controls could induce depreciation of the real effective exchange rate (Forbes, Fratzscher, and Straub, 2015) and lead to significant declines in GDP (Forbes and Klein, 2015). In a similar vein, country-specific studies have found mixed results: that outflow controls in Malaysia were effective and improved macroeconomic conditions but were ineffective in other countries (Kaplan and Rodrik, 2001; Edison and Reinhart, 2001; Magud, Reinhart, and Rogoff, 2018); and that outflow controls brought only some short-run benefits in Russia but were ineffective over longer horizons (Lougani and Mauro, 2000). Our paper seeks to provide an answer to at least one question on the impact of capital outflow controls: that is, how they affect trade, and

importantly, to identify a key mechanism through which that happens (i.e. trade finance stemming from loss of confidence in the banking system).[1]

Finally, our paper adds to the literature on firms' liquidity management. Prior literature has documented that firms increase their cash holdings after negative funding shocks, which leads them to reduce investment (Almeida, Campello and Weisbach, 2004; Berg, 2018; Beck, Da-Rocha-Lopes and Silva, 2021). Others provide evidence that cash buffers help firms navigate through shocks, such as a tightening in monetary policy, credit supply shocks or even cyberattacks (Ottonello and Winberry, 2020; Joseph, Kneer, van Horen and Saleheen, 2020; Crosignani, Macchiavelli and Silva, 2023). We contribute to this literature by documenting how cash-rich firms are able to provide cash collateral in exchange for letters of credit, when foreign banks no longer accept guarantees from domestic banks, and thus continue importing during a severe downturn.

Our paper proceeds as follows. Section III provides background information on the institutional details of capital controls in Greece, the data we use, and how trade credit functions. Section IV presents the results of capital controls on imports (and exports through imports) via the bank intermediation channel. Section V presents the results of EBRD's intervention. Section VI concludes.

3. Background and data

3.1 Institutional details of the capital controls regime in Greece

To avoid a default on its sovereign debt in 2010, the Greek state entered a three-year lending program with the IMF, the European Central Bank, and the European Commission (the "IMF-ECB-EC program"). A second program was initiated in 2012, which included the first recapitalization of the banking system. The banking system underwent a second recapitalization in 2013, but by the end of 2014 it was clear that a third support program with the IMF-ECB-EC was needed. That program didn't come until November 2015,

[1] Erten, Korinek and Ocampo (2019) and Rebucci and Ma (2019) provide a detailed overview of the recent literature on capital controls. Montiel (2022) examines the evolution of IMF's views on capital account policies.

however, largely due to political constraints. In the interim, the first six months of 2015 saw a run on the banking system due to increased political uncertainty. A cumulative 48.6 billion euros (or more than one quarter of total deposits) was withdrawn from the banking system, concurrent with an 82 billion increase in Eurosystem funding administered by the ECB and the Bank of Greece (via Emergency Liquidity Assistance) (Figure 1).[2] The extraordinary political turmoil followed by the Greek authorities' decision to hold a referendum over the terms of a potential third program resulted in the freeze of the level of Emergency Liquidity Assistance on June 28, 2015. In an effort to halt the rapid decline of bank assets and liabilities, the government immediately announced a three-week bank holiday (until July 20, 2015) and the imposition of capital outflow controls to prevent the banking system from collapsing. Capital controls undoubtedly stabilized the banking system with respect to ensuring bank solvency but did not address the fundamental cause of financial instability: the fear of Greece exiting the eurozone. In contrast, these fears peaked with the announcement of capital controls.

The capital controls policy had three goals: i. to prevent outflows of funds abroad; ii. to limit cash withdrawals from banks domestically; and iii. to prevent the decline of bank assets and liabilities. To this end, daily cash withdrawals were limited to a maximum of 60 euros per depositor per bank. A Banking Transactions Approval Committee (BTAC) was established to approve transfers of funds abroad and transactions deemed as necessary for public interest. After July 20, 2015, the BTAC was responsible for approving any international capital transfer over 100,000 euro per working day per firm. Special subcommittees were established within financial institutions which were responsible reviewing and approving (or rejecting) all capital transfers abroad under that threshold. In order to apply for the approval of a capital transfer, firms were required to submit extensive documentation to these committees which included, among other details, the firm's monthly payments for imports from July – December 2014 that were paid through the Greek banking system. The documentation requirement dramatically increased the cost of conducting trade, resulting in an average decline of imports by 15% and exports by 8% from July – December 2015 (Figure 2). This magnitude was comparable to the decline in

[2] Kotidis, Malliaropulos and Papaioannou (2022) study how the provision of Emergency Liquidity Assistance in February 2015 affected bank lending in the interbank market and the real economy.

trade at the onset of the Greek financial crisis in 2009 (Arkolakis, Doxiadis and Galenianos, 2017; Chodorow-Reich, Karabarbounis and Kekre, 2021).

3.2 Institutional details of the capital controls regime in Greece

3.2.1 Data

Our primary data source are the applications submitted to BTAC and bank subcommittees. We hand-collect the 2014 monthly import payment data from individual firm applications. We merge the payments data on the firms' tax-ID numbers with the Bank of Greece's credit register, which contains details on all loans and guarantees above one million euro at the firm-bank-quarter level from 2014Q1 – 2015Q4. From the credit register, we are interested in the total value of letters of guarantee for each firm-bank pair in Q4 of 2014, which is the broader category under which letters of credit are classified. In absence of more granular data, we use letters of guarantee as a proxy for letters of credit. Since the firms in our sample actively trade internationally, this is a reasonable proxy for our empirical analysis. We then add annual firm-balance sheet data from ICAP, the largest business registry in Greece, and monthly customs data from the Hellenic Statical Authority (ELSTAT) that report firm imports at the 5-digit product and exports at the 5-digit product-destination level. Once merged, we are left with complete data on payments, letters of credit, balance sheet, and detailed trade data for 120 firms which is at the firm-bank-quarter level for letters of credit data, at the firm-product-month level for imports data, and at the firm-product-destination-month level for exports data. Compared to the universe of importers and exporters in Greece, the firms in our sample account for approximately 35% of imports and 30% of exports as of 2014. In other words, the firms in our sample are relatively large and as such our analysis should be seen as providing lower bound estimates of the true effects. Summary statistics of our variables of interest are provided in Appendix Table 1.

4. Methodology and results

4.1 Impact on trade of firms' direct exposure to the domestic banking system

In this section we present our measure of firm-level exposure to the Greek banking system and estimate the impact of capital outflow controls on firm trade, depending on this level of exposure. Our *a priori* hypothesis is that the reduction in imports should be larger for firms that relied more on the Greek banking system for import payments because they were more exposed to foreign payment restrictions during the period of capital controls. A reduction in exports should follow for those firms who rely both on the Greek banking system and on imported intermediary goods.

In order to define exposure to the Greek banking system for importing firms, it is important to understand that firms in Greece (as elsewhere) can pay for imports in various ways. The most common means is through their domestic (Greek) bank, who transfers payments for imported goods from the importing firm's account to a foreign exporter (or to the foreign exporter's bank—*i.e.* the correspondent bank) on behalf of the importing firm. This transaction can be facilitated by cash in advance, letter of credit, documentary collection or draft, open account or consignment. The payment method is not immediately relevant for our purposes but will become so in the next sections. Alternative payment means include bypassing the domestic bank and paying for imports through a foreign parent company, foreign subsidiary, or foreign bank. With these payment options in mind, we thus define exposure to capital outflow controls as an importing firm's use of domestic banks for import payments. We use data from the pre-capital controls period (i.e. 2014) based on the notion that firms who made more of their payments for imports in the period prior to the crisis via the domestic banking system would have also needed to use Greek banks during the capital controls period for import payments. These firms would therefore have been more exposed to restrictions on capital outflows from the banking system compared to an importing firm who paid for goods exclusively via a foreign affiliate, for instance. To the extent that these firms switched to alternative payment means in the period leading up to capital controls (e.g. by setting up bank accounts abroad), this would work against us finding a result and, if we did, that would likely be a lower bound estimate. We aggregate the value of monthly import payments for all goods by firm *f* made through the

Greek banking system from July – December 2014, PMT_f. To control for firm size, we normalize total payments by firm *f*'s total assets as of end 2014. Formally:

$$EXPOSURE_f = \frac{\sum_{t=July\ 2014}^{December\ 2014} PMT_f}{Firm\ Size_{f2014}} \quad (1)$$

Notably, we normalize import payments using total assets rather than total imports (or total trade) because this provides us with a consistent measure of size across firms. One could alternatively use total annual imports as the normalization factor, however such a measure could be a misleading metric because the payment for imports and the timing of imports rarely match. For instance, many imports are paid via cash in advance or cash on arrival, meaning that the recording of the import payment (which would be in our numerator) could be in a different calendar year than the recorded value of the import (in the denominator). For firms with highly seasonal imports, this difference would be particularly problematic, leading to erroneously large (or small) measures of firm size. For this reason, in our main analysis that follows we use total assets. Nonetheless, in a robustness exercise, we define exposure using total imports as the normalization factor and show that our results hold.

With our measure of exposure in hand, we examine whether the collapse in trade during the capital control regime (Figure 2) can be explained by importing firms who were more exposed to the Greek banking system and saw a larger decline in imports during the controls compared to importing firms who were less reliant on Greek banks to pay for their imports. Given the granularity of our data at the firm-product-month level, we are able to estimate a within-product-month effect, which compares the imports of the same product in the same month by firms with a different dependence on the Greek banking system, before and after capital controls. This helps establish a causal link between exposure and the change in imports during the capital controls period. Specifically, we estimate:

$$Log(M_{fpt}) = \theta_f + \mu_{pt} + \omega \cdot EXPOSURE_f \cdot CC_t + \epsilon_{fpt} \quad (2)$$

where M_{fpt} are the imports by firm f of product p in month t and CC_t is a dummy variable equal to one during the capital controls period, July-December 2015.[3] The regression includes firm fixed effects, θ_f, which control for all time-invariant unobserved

[3] Our focus is on period July – December 2015 as this was the most acute phase of capital controls in Greece.

heterogeneity at the firm level. It also includes product-time fixed effects, μ_{pt}, which control for time-varying heterogeneity in the demand of each product during the period under analysis.[4] With this rich set of fixed effects, our coefficient of interest, ω, captures how imports of the same product during capital controls changed depending on a firm's exposure to the Greek banking system. Importantly, this also implicitly controls for a number of essential goods which were exempted from the documentation requirements under the capital controls policies (for instance, energy and pharmaceuticals) as well as for seasonality in imports of goods since we compare firms with different exposure measures that import the same product in the same month.

Table 1 presents the estimates from equation (2). In column (1) we report results with a less strict fixed effect specification, including separately firm, month, and 5-digit product fixed effects. In column (2) we include 5-digit product-month fixed effects (as specified in equation (2)), which tightens the analysis to examine imports of the same product in the same month across firms with different exposure. The coefficient of interest is negative and statistically significant at the 1 percent level across both specifications, confirming our hypothesis that firms who were more exposed to the Greek banking system—thus facing stricter regulations on capital outflows—saw a larger decline in imports during the capital controls period. In terms of the economic effect, a firm with one standard deviation higher exposure experienced an additional 3.2% drop in imports. Results are robust to our alternative definition of exposure (using total imports in the denominator), which we report in Appendix Table 2.

Table 2 proceeds to estimate the impact on exports of the reduction in imports due to capital outflow controls for more exposed firms. Exports are an important source of currency for Greece, and particularly so during capital controls when the Bank of Greece was trying to maintain liquidity in the banking system. However, by limiting imports there may have been the unintended consequence of also limiting exports—particularly of goods that rely on imported intermediate inputs (Bas and Strauss-Khan, 2014; Feng, Li and Swenson, 2016). We use a two stage least squares (2SLS) model to estimate the extent to which the decline in imports drove a subsequent decline in exports. Our dataset is now at

[4] One limitation of our import data is that we don't observe the country of origin of imports.

the firm, product, export-destination, month level. The first stage regression is simply equation (2) but estimated on a restricted sample of firms for which we have export data. In the second stage, we regress exports, X_{fpdt}, on our estimated imports from the first stage, $\widehat{M_{ft}}$, plus fixed effects consistent with the granularity of our export-level data (firm fixed effects, θ_f, and product-destination-month fixed effects, μ_{pdt}). Specifically:

$$Log\left(X_{fpdt}\right) = \theta_f + \mu_{pdt} + \gamma \log(\widehat{M_{ft}}) + \epsilon_{fpdt} \qquad (3)$$

Results are reported in Table 2 for both stages of the regression. Our first stage estimates are consistent with those in Table 1, and despite a considerably smaller sample size, the F-statistic indicates that our direct firm-level exposure measure is a reasonable instrument for imports in the context of the two-stage least squares methodology. The second stage results are of ultimate interest to us, and together with the first stage results they indicate that imports of firms more exposed to the Greek banking system also reduced exports significantly more than less exposed firms. This is consistent with there being unintended consequences of capital outflow controls which spilled over to the export market via a reduction in imported intermediate goods for exporting firms.

4.2 Bank intermediation channel

Having established that imports fell during the capital controls period for firms more exposed to the banking system, we now turn to why. Although there are possibly many reasons as to why imports fell (e.g. in-advance cash required by foreign exporters), we focus on the role of domestic banks as trade guarantors. Our choice highlights an important tradeoff of drastic policy measures such as capital outflow controls: although they are an effective measure in stopping a bank run by ensuring bank solvency (as in the case of Greece in 2015, Cyprus in 2013 and Iceland in 2008), they may lead to a loss of confidence regarding the ability of domestic banks to guarantee future payments. In the case of Greece, fears of leaving the eurozone likely exacerbated these confidence effects. Intuitively, a heavily devalued currency would have weakened firms' and households' balance sheets because salaries and goods and services would be priced in the new currency while debt obligations would remain in euro. As a result, credit risk for Greek banks would increase and the risk of banks turning insolvent would undermine their role as trade guarantors. Foreign correspondent banks – acting on behalf of foreign exporters and facing a general

loss of confidence in the Greek banking system and inability to adequately assess the creditworthiness of Greek firms – wanted to ensure that they could still receive full payments for their goods in a convertible currency (typically either euro or U.S. dollars, in the case of Greek importers). This manifested as a requirement for full cash collateral in exchange for accepting new letters of credit issued by Greek banks on behalf of Greek importers. The ultimate impact of this requirement was a rise in the cost of letters of credit for the importer. We expect that this requirement for full cash collateral during the period of capital controls should have reduced the issuance of letters of credit and, based on evidence that trade volumes decline when banks' ability or willingness to issue letters of credit declines (Niepmann and Schmidt-Eisenlohr, 2017; Ahn, 2020), that this reduction in letters of credit reduced imports further. We formally show this bank intermediation channel of the decline in imports in this section and the next.

To determine whether a decline in letters of credit is driven by the cash collateral rule, we examine how the probability of issuing a new letter of credit as well as its value changed between each firm-bank pair before and after capital controls, depending on whether firms were affected by the cash collateral requirement. We define a firm as being *affected* if it did not have enough cash on hand to cover the value of their letters of credit from each bank. We use the pre-period to avoid complicating our result with two-way causal effects. Specifically, we take the ratio of letters of credit of the firm f -bank b pair at the end of 2014 ($LC_{f,b,2014}$) to the firm's cash balance in 2014 ($Cash_{f,2014}$), and define a firm as affected if that ratio was greater than one:

$$AFFECTED_{bf} = \begin{cases} 1, & \frac{LC_{f,b,2014}}{Cash_{f,2014}} > 1 \\ 0, & \frac{LC_{f,b,2014}}{Cash_{f,2014}} \leq 1 \end{cases} \qquad (4)$$

Note that this measure is imperfect in the sense that a firm may have sufficient cash to cover their letters of credit with each individual bank with whom the firm has a relationship but may have insufficient cash to cover the total of their letters of credit across all banks. We address this issue later when we aggregate letters of credit at the firm level and check how they changed before and after capital controls.

Our empirical specification regresses a dummy variable equal to one if bank *b* does not originate a new letter of credit to firm *f* in quarter *t* given that there was at least one active letter of credit in quarter *t-1*, Y_{bft}. This captures the extensive margin of letters of credit issuance. We alternatively look at the intensive margin, where we define our dependent variable, Y_{bft}, as the log value of letters of credit issued by bank *b* to firm *f* in quarter *t*. Formally, our specification takes the form:

$$Y_{bft} = \alpha_{fb} + \lambda_{ft} + \gamma_{bt} + \eta \cdot AFFECTED_{bf} \cdot CC_t + \varepsilon_{fbt} \quad (5)$$

Our model interacts our affected indicator variable, $AFFECTED_{bf}$, with a variable for the capital controls period, CC_t, equal to one from July - December 2015 and otherwise zero. We include a rich set of fixed effects that help us isolate the cash collateral channel from confounding factors. These are (i) firm-bank fixed effects (α_{fb}), which allow us to control for any relationship-specific changes in letters of credit, (ii) firm-quarter fixed effects (λ_{ft}), which control for firm-specific demand for letters of credit over time, and (iii) bank-quarter fixed effects (γ_{bt}), which allow us to control for bank-specific supply constraints in each quarter. Finally, we also estimate an alternative version of the model which includes an interaction between the affected indicator variable and a variable equal to one for the period January 2015-June 2015, which we label *political uncertainty*. The purpose of this additional interaction is to determine whether our main result during the capital controls period is driven not by the controls themselves but by the heightened uncertainty during the six-month period prior to capital controls. The political uncertainty variable captures a period of heightened uncertainty (e.g. change in government, tough negotiations with official creditors) without capital controls. If our hypothesis is true—that the capital controls-induced uncertainty and loss of confidence in the banking system affected the letter of credit issuance—then we expect our coefficient estimate on the political uncertainty interaction term to be insignificant.

Results on the extensive margin are presented in Table 3 columns (1)-(2), and on the intensive margin in columns (3)-(4). In columns (2) and (4) we report results for the specification including the interaction with the period of political uncertainty. The results show that importing firms who were affected by the cash collateral rule—that is their cash holdings were sufficiently low to constrain their ability to be issued letters of credit—

experienced a 15.3% decline in the probability of being issued a new letter of credit (columns (1)-(2)) and, conditional on securing one, a 45% reduction in the amount of letters of credit banks issued them during the period of capital controls (columns (3)-(4)).

In Table 4, we aggregate the data to the firm level (that is, we sum up all the letters of credit across all banks for each firm). The *affected* variable is now defined by firm's ability to cover their total letters of credit with existing cash holdings. The results are consistent with those at the firm-bank level, showing that firms who are more cash constrained received 13% less letters of credit during the capital control period.

Finally, in Appendix Table 3 we conduct a placebo experiment. We estimate a regression specification similar to equation (5) and on an identical sample, except with our dependent variable being either the probability that firm *f* receives a new loan from bank *b* in time *t* (instead of a new letter of credit) or the total amount of loans outstanding from bank *b* to firm *f* in period *t* (instead of the total amount of letters of credit). Statistically significant results would imply that our main results may be driven by a reduction in bank credit during capital controls, and not indicative of the specific letters of credit channel that we have thus far laid out. In fact, our coefficient estimates of interest are all statistically insignificant.

Taken together, the results suggest that the capital controls-induced uncertainty reduced the issuance of letters of credit by domestic banks for firms more affected by the cash collateral requirement.

4.3 Total impact of capital controls

The preceding sections have established two main results: i. imports during the capital controls period declined more for firms who were more exposed to the Greek banking system; and ii. bank intermediation for imports declined for firms who faced cash constraints. We now bring these two results together to examine the extent to which the capital controls-induced decline in imports is further amplified by the bank intermediation channel.

We adopt a similar model specification as in (2) and expand it to allow for the interaction of our ex-ante firm-level exposure measure with a dummy variable equal to one if a firm's cash was lower than its total letters of credit. Formally, our model takes the form:

$$\ln(M_{fpt}) = \theta_f + \mu_{pt} + \beta_1 \cdot EXPOSURE_f \cdot CC_t + \beta_2 \cdot AFFECTED_f \cdot CC_t + \beta_3 \cdot EXPOSURE_f \cdot AFFECTED_f \cdot CC_t + \varepsilon_{fpt} \quad (6)$$

All variables are defined as they were in equations (2) and (5). Our main coefficient of interest is β_3, which indicates the extent to which firms with a given level of exposure and who were affected by the bank intermediation channel (*i.e.* were constrained by the full cash collateral requirement) decreased their imports of individual products relative to the pre-capital controls period. We report results in Table 5. Column (1) uses less restrictive fixed effect specifications, and column (2) more restrictive product-time fixed effects – implying that we are capturing variation across firms within a given product category for a specific month. Our estimates are consistent with our initial hypothesis: firms who are more exposed to the banking system and faced a cash collateral constraint, which limited banks' issuance of letters of credit, saw a 63% decline in imports during the capital controls period.

5. Policy intervention

Our analysis so far has shown that banks' loss of their role as trade guarantors following the imposition of capital controls led to a reduction in imports and exports. Hence, while capital outflow controls seem to have important benefits for banking stability, they come at a cost to the real economy. In this section we ask whether policy tools can help reverse some of these costs, even while capital controls remain in place.

We exploit a unique program by the European Bank for Reconstruction and Development (EBRD)—the Joint Trade Facilitation Programme—which went into effect in March 2016. Under this program the EBRD guaranteed payments under letters of credit issued by Greek banks to international banks. The EBRD thus took on the credit risk of non-payment by issuing banks, which Greek banks were no longer able to carry themselves. The ultimate outcome of the program was a decrease in the cost of importing,

since firms were no longer required to post cash as collateral. To estimate the real impact of this program in reversing the effects of capital outflow controls, we look at the extent to which imports increased during the program for those firms most affected by capital controls.

Specifically, we estimate the regressions:

$$Log(M_{fpt}) = \theta_f + \mu_{pt} + \delta_1 \cdot EXPOSURE_f \cdot EBRD_t + \delta_2 PARTICIPANT_f \cdot EBRD_t + \delta_3 \cdot EXPOSURE_f \cdot PARTICIPANT_f \cdot EBRD_t + \epsilon_{fpt} \quad (7)$$

where $M_{fpt}, \theta_f, \mu_{pt},$ and $EXPOSURE_f$ are defined as they were in equations (2), (5) and (6). The variable $PARTICIPANT_f$ is a dummy variable equal to one if firm f had access to all four banks that participated in the EBRD program. We face an important constraint in defining a firm-level variable that indicates whether any firm *f* would benefit from the EBRD's program. The program allocated 50 million euro in guarantees to each of the four participating banks, which was substantially below the total value of transactions that each of those banks was processing at the time. It is impossible to allocate euro-for-euro the EBRD guarantees to firm-specific payments. Our definition is thus a second-best alternative – we posit that those firms who had access to all banks that participated in the EBRD program were more likely to benefit from it compared to those firms who only had relationships with three or less of the banks. Finally, $EBRD_t$ is a dummy variable equal to one during the period of the EBRD program.

Our main coefficient of interest is δ_3, which indicates whether for two firms with similar exposure to capital outflow controls, the firm with access to the EBRD program imported relatively more after the program was initiated. Results are reported in Table 6, with columns (1) and (2) differentiated by the strictness of the fixed effects. The first row confirms that those firms who did have access to banks that received guarantees from the EBRD imported more than firms without full access. This suggests that when (at least a portion of) the costs related to the capital control-induced uncertainty are lifted from firms, trade rebounds.

6. Conclusion

Banks' role as guarantors in trade is critical for the flow of imports and exports. We estimate the impact on trade when this role is wholly disabled. Our focus is on Greece, which imposed capital outflow controls to stabilize the banking system in July 2015. We show that this drastic response, while ensuring the solvency of domestic banks, was associated with a significant disruption in trade. Capital outflow controls triggered an increase in the cost of trade for importers via the need for additional documentation for external payments and the need for full cash collateral for letters of credit. Following the imposition of capital controls and due to the risk of Greece's exit from the euro area and subsequent potential devaluation of its new currency that would hurt bank balance sheets, foreign banks required full cash collateral to accept letters of credit from Greek banks – that is, Greek banks could no longer function as guarantors of trade on their own. We show that cash-constrained firms who were more dependent on the Greek banking system to make their payments abroad suffered a significant decline in their imports and, subsequently, exports. We finally provide evidence that government (or quasi-government) support for banks via letter of credit guarantees can help imports recover even while capital control policies remain in place.

References

Ahn, J., 2020. A Theory of Domestic and International Trade Finance. Emerging Market Finance: New Challenges and Opportunities. International Finance Review, vol.21, 2020. Emerald Publishing Limited, 203-229

Ahn, J. and Sarmiento, M., 2019. Estimating the direct impact of bank liquidity shocks on the real economy: Evidence from letter-of-credit import transactions in Colombia. Review of International Economics, 27(5):1510-1536

Alfaro, L., Chari, A. and Kanczuk F., 2017. The Real Effects of Capital Controls: Firm-Level Evidence from a Policy Experiment. Journal of International Economics, 108:191-210

Almeida, H., Campello, M. and Weisbach, M.S., 2004. The cash flow sensitivity of cash. The Journal of Finance, 59(4):1777-1804

Antras, P. and Foley, CF., 2015. Poultry in Motion: A Study of International Trade Finance Practices. Journal of Political Economy, 123(4):853-901

Arkolakis, C., Doxiadis, A. and Galenianos, M., 2017. The Challenge of Trade Adjustment in Greece. *Beyond Austerity: Reforming the Greek Economy.* MIT Press

Auboin, M. and Meier-Ewert, M., 2003. Improving the availability of trade finance during financial crises. WTO Discussion Paper, No. 2

Bas, M. and Strauss-Kahn, V., 2014. Does importing more inputs raise exports? Firm-level evidence from France. Review of World Economics, 150(2):241-275

Beck, T., Da-Rocha-Lopes, S. and Silva, A., 2021. Sharing the pain? Credit supply and real effects of bank bail-ins, The Review of Financial Studies, 34(4):1747-1788

Berg, T., 2018. Got rejected? Real effects of not getting a loan. The Review of Financial Studies, 31(12):4912-4957

Chamon, M. and Garcia, M., 2016. Capital controls in Brazil: Effective?. Journal of International Money and Finance, 61:163-187

Chodorow-Reich, G., Karabarbounis, L. and Kekre, R., 2021. The Macroeconomics of the Greek Depression. NBER Working Paper

Crosignani, M., Macchiavelli, M. and Silva, A., 2023. Pirates without borders: The propagation of cyberattacks through firms' supply chains. Journal of Financial Economics, 147(2):432-448

Crozet, M., Demir, B. and Javorcik, B., 2022. International Trade and Letters of Credit: A Double-Edged Sword in Times of Crises. IMF Economic Review, 70:185-211

Desai, M., Foley, CF. and Hines, J., 2006. Capital Controls, Liberalizations, and Foreign Direct Investment. The Review of Financial Studies, 19(4):1433-1464

Edison, H. and Reinhart, C., 2001. Stopping hot money. Journal of Development Economics, 66(2):533-553

Edwards, S., 2007. Capital controls, capital flow contractions, and macroeconomic vulnerability. Journal of International Money and Finance, 26(5):814-840

Eichengreen, B., Rose, A. and Wyplosz, C., 1994. Speculative Attacks on Pegged Exchange Rates: An Empirical Exploration with Special Reference to the European Monetary System. NBER Working Paper No. W4898

Erten, B., Korinek, A. and Ocampo, JA., 2021. Capital Controls: Theory and Evidence. Journal of Economic Literature, 59(1):45-89

Feng, L., Li, Z. and Swenson, D., 2016. The Connection between Imported Intermediate Inputs and Exports: Evidence from Chinese Firms. Journal of International Economics, 101(2): 86-101

Forbes, K. and Klein, M., 2015. Pick Your Poison: The Choices and Consequences of Policy Responses to Crises. IMF Economic Review, 63:197–237

Forbes, K., 2007. One cost of the Chilean capital controls: Increased financial constraints for smaller traded firms. Journal of International Economics, 71(2): 294–323

Forbes, K., Fratzscher, M., and Straub, R., 2015. Capital-flow management measures: What are they good for?. Journal of International Economics, 96(1): 76-97

Forbes, K., Fratzscher, M., Kostka, T. and Straub, R., 2016. Bubble thy Neighbour: Portfolio Effects and Externalities from Capital Controls. Journal of International Economics, 99:85-104

Glady, N. and Potin, J., 2011. Bank Intermediation and Default Risk in International Trade - Theory and Evidence. mimeo

Glick, R. and Hutchinson, M., 2000. Stopping ‘Hot Money’ or Signaling Bad Policy? Capital Controls and the Onset of Currency Crises. Federal Reserve Bank of San Francisco and University of California–Santa Cruz.

Johnson, S. and Mitton, T., 2003. Cronyism and Capital Controls: Evidence from Malaysia. Journal of Financial Economics, 67(2):351-382

Joseph, A., Kneer, C., van Horen, N. and Saleheen, J., 2020. All you need is cash: corporate cash

holdings and investment after the financial crisis. Bank of England Working Paper No. 843

Kaplan, E. and Rodrik, D., 2001. Did the Malaysian Capital Controls work? NBER Working Paper, No. 8142

Keller, L., 2018. Prudential Capital Controls and Risk Misallocation: Bank Lending Channel. SSRN Working Paper

Kotidis, A., Malliaropulos, D. and Papaioannou, E., 2022. Public and Private Liquidity during Crises Times: Evidence from Emergency Liquidity Assistance (ELA) to Greek Banks. Bank of Greece Working Paper No. 304

Loungani, P. and Mauro, P., 2000. Capital Flight from Russia. IMF Policy Discussion Papers PDP/00/6

Magud, N., Reinhart, C. and Rogoff, K., 2018 Capital Controls: Myth and Reality--A Portfolio Balance Approach. Annals of Economics and Finance, 19(1):1-47

Montiel, P.J., 2022. IMF Advice on Capital Flows: How Well is it Supported by Empirical Evidence?. Journal of Globalization and Development. 13(1):149-186.

Niepmann, F. and Schmidt-Eisenlohr, T., 2017. International Trade, Risk and The Role of Banks. Journal of International Economics, 107:111-126

Niepmann, F. and Schmidt-Eisenlohr, T., 2017. No guarantees, no trade: How banks affect export patterns. Journal of International Economics, 108: 338-350

Ostry, J., Ghosh, A., Chamon, M. and Qureshi, M., 2012. Tools for managing financial-stability risks from capital inflows. Journal of International Economics, 88(2): 407-421

Ottonello, P. and Winberry, T., 2020. Financial heterogeneity and the investment channel of monetary policy. Econometrica, 88(6):2473-2502

Rebucci, A., and Ma, C, 2019. Capital Controls: A Survey of the New Literature. NBER Working Paper, No. 26558

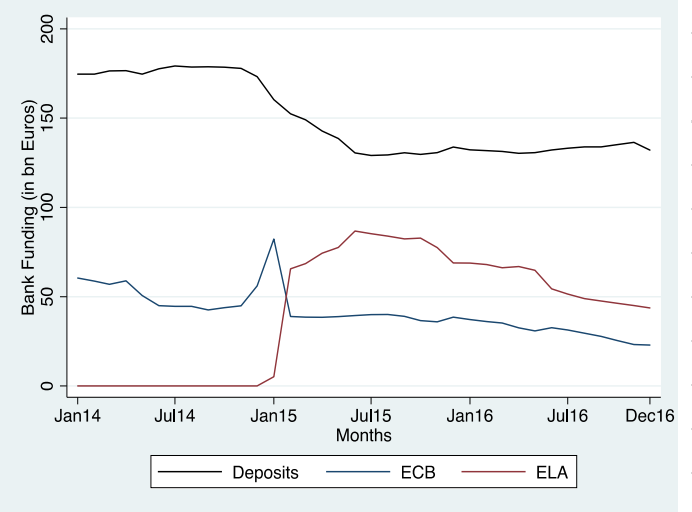
Rossi, M., 1999. Financial Fragility and Economic Performance in Developing Countries. IMF Working Paper No. 99/66

Schmidt-Eisenlohr, T., 2013. Towards a theory of trade finance. Journal of International Economics, 91(1):96-112.

Wei, SJ & Zhang, Z., 2007. Collateral Damage: Exchange Controls and International Trade. Journal of International Money and Finance, 26(5): 841-63

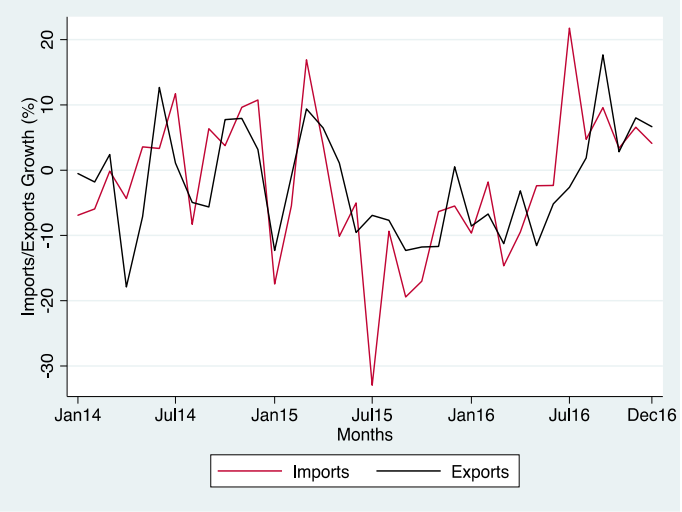
Zeev, NB., 2017. Capital controls as shock absorbers. Journal of International Economics, 109:43-67

Figure 1: Evolution of Bank Funding



Note: The figure plots the evolution of bank deposits and central bank funding in period 2014-2016. Capital controls were imposed in July 2015. Source: Bank of Greece.

Figure 2: Collapse of Trade Growth during Capital Controls



Note: The figure plots the year-on-year monthly growth of imports and exports of goods (excluding services) in period 2014-2016. Capital controls were imposed in July 2015. Source: Hellenic Statistical Authority.

Table 1: Impact of Capital Outflow Controls on Imports

	Log(Imports)	
	1	*2*
Exposure * Capital Controls	-0.117***	-0.120***
	(0.021)	(0.022)
Firm FE	yes	yes
Product FE	yes	no
Month FE	yes	no
Product * Month FE	no	yes
Observations	62140	62140
R^2	0.631	0.682

Note: Log(Imports) is the log imports of product p by firm f in month t. Exposure is the share of import-related payments made through Greek banks from July - December 2014 divided by firm's size (total assets). Capital Controls is a dummy variable equal to one from July - December 2015. Standard errors are two-way clustered at a firm's province and industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 2: Impact of Capital Outflow Controls on Exports through Imports

First-Stage	Log(Imports)	
	1	*2*
Exposure * Capital Controls	-0.349***	-0.105***
	(0.039)	(0.026)
First-Stage F-statistic	81.93	16.12
p-value	0.000	0.000
Second-Stage	Log(Exports)	
	3	*4*
Log(Imports)	0.814***	3.471***
	(0.073)	(0.611)
Firm FE	yes	yes
Product * Destination FE	yes	no
Month FE	yes	no
Product * Destination * Month FE	no	yes
Observations	16141	16141

Note: Log(Exports) is the log exports of product p to destination d by firm f in month t. Log(Imports) is the log imports of firm f on month t. Exposure is the share of import-related payments made through Greek banks from July - December 2014 divided by firm's size (total assets). Capital Controls is a dummy variable equal to one from July - December 2015. Standard errors are two-way clustered at a firm's province and industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 3: Cash Collateral Constraints and Letters of Credit

	Pr(LCt=0 | LCt-1>0)		Log(LC)	
	1	*2*	*3*	*4*
Affected * Capital Controls	0.149***	0.153***	-0.286***	-0.451**
	(0.000)	(0.005)	(0.000)	(0.110)
Affected * Political Uncertainty		0.007		-0.298
		(0.020)		(0.161)
Bank * Firm FE	yes	yes	yes	yes
Bank * Quarter FE	yes	yes	yes	yes
Firm * Quarter FE	yes	yes	yes	yes
Observations	1287	1287	820	820
R^2	0.643	0.643	0.964	0.965

Note: Pr(LCt=0 | LCt-1>0) is a dummy variable equal to one if a bank b does not originate a new letter of credit to firm f in quarter t given there was at least one active letter of credit in quarter t-1. Log(LC) is bank-firm log letters of credit. Affected is a dummy variable equal to one if firm's f cash is lower than the total value of its letters of credit with a specific bank. Capital Controls is a dummy variable equal to one from July - December 2015. Political Uncertainty is a dummy variable equal to one from January - June 2015. Standard errors are two-way clustered at a firm's industry and bank level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 4: Firm's Total Letters of Credit

	Log(LC)	
	1	*2*
Affected * Capital Controls	-0.155***	-0.131***
	(0.013)	(0.031)
Affected * Political Uncertainty		0.049
		(0.033)
Firm FE	yes	yes
Quarter FE	yes	yes
Observations	607	607
R^2	0.923	0.923

Note: Log(LC) is firm's f log of total letters of credit. Affected is a dummy variable equal to one if firm's f cash is lower than the value of its total letters of credit. Capital Controls is a dummy variable equal to one from July - December 2015. Political Uncertainty is a dummy variable equal to one from January - June 2015. Standard errors are two-way clustered at a firm's province and industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 5: Total Impact of Capital Controls on Imports

	Log(Imports)	
	1	*2*
Exposure * Affected * Capital Controls	-0.532***	-0.627***
	(0.065)	(0.115)
Affected * Capital Controls	0.248***	0.323***
	(0.027)	(0.040)
Exposure * Capital Controls	0.011	0.039
	(0.021)	(0.032)
Firm FE	yes	yes
Product FE	yes	no
Month FE	yes	no
Product * Month FE	no	yes
Observations	62140	62140
R^2	0.631	0.682

Note: Log(Imports) is the log imports of product p by firm f in month t. Exposure is the share of import-related payments made through Greek Banks from July - December 2014 divided by a firm's size (total assets). Affected is a dummy variable equal to one if firm's f cash is lower than the value of its total letters of credit. Capital Controls is a dummy variable equal to one from July - December 2015. Standard errors are two-way clustered at a firm's province and industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Table 6: The Role of Government as Trade Guarantor

	Log(Imports)	
	1	*2*
Exposure * Participant * EBRD	0.409***	0.767***
	(0.070)	(0.067)
Participant * EBRD	-0.270***	-0.330***
	(0.031)	(0.055)
Exposure * EBRD	-0.513***	-0.564***
	(0.010)	(0.015)
Firm FE	yes	yes
Product FE	yes	no
Month FE	yes	no
Product * Month FE	no	yes
Observations	34429	34429
R^2	0.649	0.677

Note: Log(Imports) is the log imports of product p by firm f in month t. Exposure is the share of import-related payments made through Greek Banks from July - December 2014 normalized by a firm's size (total assets). Participant is a dummy equal to one if a firm f has a relationship with all four banks that participated in the EBRD guarantee program. EBRD is a dummy variable equal to one from March - December 2016. Standard errors are two-way clustered at a firm's province and industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Appendix Tables

Appendix Table 1: Summary Statistics

Variables	*Unit*	*N*	*mean*	*sd*
Bank-Firm level				
Affected	0/1	1287	0.30	0.46
Pr(LCt=0 | LCt-1>0)	0/1	1287	0.10	0.30
Log(LC)	-	820	13.81	2.17
Firm level				
Log(Imports)	-	62140	5.80	3.61
Log(Exports)	-	16141	3.85	3.24
Exposure (normalized by size)	%	62140	0.35	0.27
Exposure (normalized by total imports)	%	62140	0.52	0.11
Log(LC)	-	607	14.57	1.77
Affected	0/1	607	0.48	0.50

Note: The table presents summary statistics of the main variables used in our analysis.

Appendix Table 2: Alternative Measure of Firm Exposure to Capital Controls

	Log(Imports)	
	1	*2*
Exposure * Capital Controls	-0.249*	-0.257**
	(0.116)	(0.084)
Firm FE	yes	yes
Product FE	yes	no
Month FE	yes	no
Product * Month FE	no	yes
Observations	62140	62140
R^2	0.631	0.682

Note: Log(Imports) is the log imports of product p by firm f in month t. Exposure is the share of import-related payments made through Greek banks from July - December 2014 divided by firm's size (total assets). Capital Controls is a dummy variable equal to one from July - December 2015. Standard errors are two-way clustered at a firm's province and industry level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

Appendix Table 3: Placebo Experiment on Loans

	Pr(Lt=0 | Lt-1>0)		Log(L)	
	1	*2*	*3*	*4*
Affected * Capital Controls	0.030	0.033	0.105	0.067
	(0.043)	(0.052)	(0.100)	(0.094)
Affected * Political Uncertainty		0.007		-0.072
		(0.030)		(0.076)
Bank * Firm FE	yes	yes	yes	yes
Bank * Quarter FE	yes	yes	yes	yes
Firm * Quarter FE	yes	yes	yes	yes
Observations	1287	1287	820	820
R^2	0.612	0.612	0.951	0.951

Note: Pr(Lt=0 | Lt-1>0) is a dummy variable equal to one if a bank b does not originate a new loan to firm f in quarter t given there was at least one active loan in quarter t-1. Log(L) is bank-firm log loans. Affected is a dummy variable equal to one if firm's f cash is lower than the total value of its letters of credit with a specific bank. Capital Controls is a dummy variable equal to one from July - December 2015. Political Uncertainty is a dummy variable equal to one from January - June 2015. Standard errors are two-way clustered at a firm's industry and bank level. Statistical significance is denoted as *p<0.1, **p<0.05, ***p<0.01.

BANK OF GREECE WORKING PAPERS

304. Kotidis, A., D. Malliaropulos and E. Papaioannou, "Public and private liquidity during crises times: evidence from emergency liquidity assistance (ELA) to Greek banks", September 2022.

305. Chrysanthakopoulos, C. and A. Tagkalakis, "The effects of fiscal institutions on fiscal adjustments", October 2022.

306. Mavrogiannis, C. and A. Tagkalakis, "The short term effects of structural reforms and institutional improvements in OECD economies", October 2022.

307. Tavlas, S. G., "Milton Friedman and the road to monetarism: a review essay", November 2022.

308. Georgantas, G., Kasselaki, M. and Tagkalakis A., "The short-run effects of fiscal adjustment in OECD countries", November 2022

309. Hall G. S., G. S. Tavlas and Y. Wang, "Drivers and spillover effects of inflation: the United States, the Euro Area, and the United Kingdom", December 2022.

310. Kyrkopoulou, E., A. Louka and K. Fabbe, "Money under the mattress: economic crisis and crime", December 2022.

311. Kyrtsou, C., "Mapping inflation dynamics", January 2023.

312. Dixon, Huw, T. Kosma and P. Petroulas, "Endogenous frequencies and large shocks: price setting in Greece during the crisis", January 2023.

313. Andreou P.C, S. Anyfantaki and A. Atkinson, "Financial literacy for financial resilience: evidence from Cyprus during the pandemic period", February 2023.

314. Hall S. G, G.S. Tavlas and Y. Wang, "Forecasting inflation: the use of dynamic factor analysis and nonlinear combinations", February 2023.

315. Petropoulos A., E. Stavroulakis, P. Lazaris, V. Siakoulis and N. Vlachogiannakis, "Is COVID-19 reflected in AnaCredit dataset? A big data - machine learning approach for analysing behavioural patterns using loan level granular information", March 2023.