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The Costs of Sovereign Default: Theory and Empirical Evidence

ABSTRACT Economic policymakers sometimes perceive a sovereign default as a jump into the unkown. The main piece of information missing is what the costs of the default are going to be. Assessing these costs correctly is crucial for evaluating how far a country should go to avoid a default. This paper analyzes the main sources of the costs of default discussed in the theoretical literature and evaluates the empirical evidence on the matter. I classify these potential sources in three groups: (1) sanctions imposed as penalties by creditors; (2) costs related to the information content of default; and (3) costs related to domestic agents' sovereign bond holdings. I then present a simple model that captures the main intuition behind each of them. A review of the empirical evidence suggests that while the costs generated in the aftermath of defaults by traditional mechanisms, such as trade sanctions or exclusion from credit markets, have not been significant in recent decades, costs deriving from information revelation and the impact on domestic bondholders, particularly the banking system, have become major consequences of sovereign defaults.

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How costly will a sovereign default be for the defaulting country? How can these costs be limited? These are crucial questions for policymakers facing a debt crisis. Being able to estimate these costs is necessary for deciding how far a country should go to avoid default. In addition, understanding the sources of these costs is crucial to mitigate them and improve the workings of sovereign debt markets.

In recent years, governments have fought tough political battles to avoid a default, cutting pension payments or public wages, postponing investments,

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or risking the health of the domestic banking system by pushing banks to hold more sovereign debt. Governments have been willing to do all this to avoid a default because sovereign defaults are perceived to be very costly. However, the origin of these costs is not immediately clear. Sovereign debt contracts differ from corporate debt contracts mainly in that their legal framework is weaker, resulting in limited enforceability. The holder of a corporate debt contract owns a legally enforceable claim on the assets of the corporate borrower, and, in the event of default, the lender has the right to initiate actions against the borrower under the framework of a bankruptcy code. This is not the case with sovereign debt contracts. Sovereign governments are immune from bankruptcy procedures, and few of their assets could be seized in the event of a default. In addition, the overwhelming majority of sovereign debt contracts are not collateralized. Given this legal framework, it would seem that a sovereign default should not be terribly costly.

To explore the costs of sovereign default, this paper classifies the different theories into three groups. First, creditors impose costs as a penalty. The literature analyzes two main types of penalties: exclusion of the sovereign from international credit markets; and trade and other sanctions.[1] Second, costs can also derive from the information content of a default, to the extent that the default reveals information that affects agents' expectations.[2] Third, there are costs related to domestic agents' sovereign bond holdings: domestic bondholders are negatively affected by a default when the government cannot discriminate in their favor in the event of a default and is unable to compensate them adequately after it.[3]

The paper begins by presenting a simple model for each of these theories that captures the main ideas behind them. This provides the basis for exploring the similarities and differences between the various approaches. A common thread that runs through all these theories is that, although defaults are costly in terms of both output and welfare, they are the result of an optimal decision of a social-welfare-maximizing government.

The paper then reviews the empirical evidence on the costs of sovereign default. As a first pass, I evaluate the relationship between defaults

1. On exclusion from international credit markets, see Eaton and Gersovitz (1981); on trade sanctions, see Bulow and Rogoff (1989).
2. Cole and Kehoe (1998); Sandleris (2008).
3. Broner and Ventura (2011); Gennaioli, Martin, and Rossi (2014).

and economic growth. Different empirical studies suggest that sovereign defaults are associated with declines of approximately one or two percentage points in the growth of gross domestic product (GDP). These declines are larger when the economy suffers a banking crisis in addition to the default.

This section also analyzes the empirical evidence on the effects of default on trade, foreign direct investment, and foreign and domestic credit to the private sector. This analysis clarifies the different mechanisms through which defaults affect output. The empirical evidence shows that, after controlling for fundamentals, total trade in the defaulting country declines by approximately 3.2 percent a year in the first five years following the default. Given the pattern of the drop in trade, it is unlikely that these declines were generated by trade sanctions.[4] Foreign direct investment is also found to decline in the aftermath of defaults.[5] Furthermore, microdata on private sector borrowing from international credit markets indicates that sovereign defaults are systematically accompanied by a significant decline in foreign credit to domestic private firms during the debt renegotiations, which persists more than two years after the restructuring agreement is reached.[6] Finally, with regard to the effect on financial activity, a sovereign default generates a decline of 8.6 percent in private credit in the defaulting country.[7]

Finally, I analyze the empirical evidence on the duration of the exclusion of a sovereign from international credit markets in the aftermath of a default and the effect of the default on subsequent borrowing costs for the defaulting country. The duration of the exclusion is usually short-lived: the average length of the period from default to regaining access to international credit markets averaged four and a half years in the period 1980–2000, but it declined in the 1990s.[8] The evidence on higher subsequent costs of borrowing for defaulting countries is mixed. There seem to be higher borrowing costs shortly after a debt restructuring, but they disappear after two years. Furthermore, these higher borrowing costs seem to be relatively small.

The paper is organized as follows. The next section formalizes the default decision faced by a government and presents the different theories on the

4. Martinez and Sandleris (2011).
5. Fuentes and Saravia (2010).
6. Arteta and Hale (2008).
7. Gennaioli, Martin, and Rossi (2014).
8. Gelos, Sahay, and Sandleris (2011); Alessandro, Sandleris, and Van der Ghote (2011).

costs of sovereign default. The paper then analyzes the empirical evidence on the costs of default. The final section concludes.

The Costs of Sovereign Default: The Theory

To develop some intuition on the different theories regarding the costs of sovereign default, I first present a two-period model in which the only cost of default is in terms of output. This output cost could be the result of sanctions or, alternatively, a reduced-form formulation of some other mechanism (not modeled in this subsection) that generates the decline in output.

Assume that there is a small open economy with a representative agent whose welfare the government tries to maximize. There is also a group of competitive, risk-neutral foreign creditors. Creditors have access to a risk-free asset that yields the risk-free interest rate, r^f. The representative agent's income is exogenously given. Income at time 0 is y_0, while income at time 1 is uncertain, with $y_1 \in [y_{1L}, y_{1H}]$.

The government can smooth the consumption of the representative agent by borrowing from foreign creditors, using a one-period defaultable discount bond and saving the risk-free asset. The representative agent is risk averse, with a utility function given by

$$W = E_0 \sum_{t=0}^{1} \beta^t u(c_t) = u(c_0) + E_0\left[\beta u(c_1)\right]. \tag{1}$$

The government makes two decisions in this model: at $t = 0$, it chooses how much debt to issue or hold; at $t = 1$, after observing the income level, y_1, it decides whether to repay or default on the debt. The analysis focuses only on the second decision, taking the level of debt, B_1, as given. If the government defaults, it does not make any payment to creditors.[9] Repaying is costly for the government, as it involves transferring resources to foreign creditors whose

9. This assumption is extreme as it excludes any possible renegotiation that could generate a positive repayment to foreign creditors upon default, which is what usually occurs in reality. This assumption makes the presentation simpler, as it shifts the focus to the dichotomic choice between default and repayment. However, the same forces that would enforce repayment when the decision is dichotomic will also enforce it when the government can choose the optimal amount of repayment.

welfare does not enter into the government welfare function. The government's decision is as follows:

$$V(B_1, y_1) = \max_{\{ND;D\}} \{V^{ND}(B_1, y_1), V^{D}(y_1)\}, \tag{2}$$

where

$$V^{ND}(B_1, y_1) = u(y_1 - B_1) \tag{3}$$

and

$$V^{D}(y_1) = u(h(y_1)), \tag{4}$$

and where $h(y_1) \leq y_1$ captures the presence of the costs of default in terms of output. In accordance with the argument of excusable defaults, the cost of default is assumed to be increasing in the level of income: $h(y_1) = \alpha y_1$, with $\alpha \leq 1$.[10] As mentioned above, these output costs could derive from sanctions imposed by creditors upon default, as suggested by Bulow and Rogoff, or, alternatively, they could represent a reduced-form version of a more structural underlying model.[11]

The following lemma characterizes the government default set in this framework.

—*Lemma 1:* When $\alpha < 1$ there will be some B_1 such that $0 < B_1 < y_{1H}$, for which $\exists y_1^*$: $V^{ND}(B_1, y_1^*) = V^{D}(y_1^*)$. If $\forall y_1 \geq y_1^*$, the government will repay; if $\forall y_1 < y_1^*$, it will choose to default.

—*Proof:* Since the government is indifferent between repaying and defaulting when income is y_1^*, the key consideration is how V^{ND} and V^{D} change as y_1 increases:

$$\frac{\partial V^{ND}(B_1, y_1)}{\partial y1} = \frac{\partial u}{\partial c_1} > \frac{\partial V^{D}(y_1)}{\partial y1} = \frac{\partial u}{\partial c_1}\alpha.$$

If B_1 is too large, there might not exist such a y_1^*. However, it is straightforward to show that such a B_1 could never arise in equilibrium. Moreover,

10. Grossman and van Huyck (1988).
11. An example is provided later in this section.

if $\alpha = 1\ \forall y_1$ (that is, if defaults are costless), then the government's decision is trivial. Repayment entails giving up resources; defaulting does not. Therefore, the government will always choose to default, but creditors anticipate this, so the equilibrium price of the debt will be zero. In other words, if defaults were costless, the government would be unable to borrow.

For a given B_1, let π be the probability of $y_1 \geq y_1^*$ or, equivalently, the probability that $V^{ND} \geq V^D$. In other words, π is the probability of repaying, and $(1 - \pi)$ is the probability of default. As B_1 increases, the probability of repaying, π, falls, because $V^{ND}(B_1, y_1)$ increases, but $V^D(y_1)$ remains unchanged. So, as B_1 increases, the level of output, y_1^*, that leaves the government indifferent between repaying or defaulting becomes higher, and as a result the probability of repaying falls.

Since foreign creditors are risk neutral and can invest at the risk-free rate, r^f, as an outside option, the bond price, q, in equilibrium will be such that

$$q\left(1 + r^f\right) = \pi 1 + \left(1 - \pi\right)0,$$

which implies that

$$q = \frac{\pi}{1 + r^f} = \frac{\Pr\left[V^{ND}\left(B_1, y_1\right) \geq V^D\left(y_1\right)\right]}{1 + r^f}. \tag{5}$$

That is, as the probability of default increases (lower π), the bond price falls. In particular, if $\pi = 1$, the price of the bond will be equal to that of the risk-free asset.

Penalties Imposed by Creditors

Having provided some intuition on the default decision using a simple two-period model, I now extend the model to infinite time to describe what has become the workhorse model in the quantitative sovereign debt literature. The costs of default are now twofold. First, as in the previous section, a default triggers sanctions that generate an output cost. Second, a default also results in exclusion from credit markets. After the default, every period there is an exogenously given probability θ that the government will regain access to the markets.[12]

12. Yue (2010) models the probability of reaccess as the result of a bargaining game between creditors and the government.

For the exclusion from credit markets to be costly, the government must not be able to replicate the payoffs from the contracts from which it is excluded.[13] Given the standard features of most real-world sovereign debt instruments, if the government could save after defaulting, it could undo most of the costs of credit market exclusion. Therefore, following the practice in the sovereign debt literature, I assume that a government enters financial autarky after a default: it can neither borrow nor save and lend.[14]

The setup of the model follows Aguiar and Gopinath, as well as Arellano, who adapt the classic work by Eaton and Gersovitz.[15] The representative agent's utility function is given by

$$W = E_0 \sum_{t=0}^{\infty} \beta^t u(c_t), \tag{6}$$

with standard assumptions on $u(.)$.

Every period, the government has to decide whether to default or to repay its outstanding debts. If it chooses to repay, it must also decide how much it wants to borrow. The government problem can be written recursively as follows:

$$V(B, y) = \max_{\{ND; D\}} \{V^{ND}(B, y), V^{D}(y)\}, \tag{7}$$

where

$$V^{D}(y) = u(h(y)) + \beta \int_{Y} [\theta V(0, y') + (1 - \theta) V^{D}(y')] f(y', y) dy'; \tag{8}$$

$$V^{ND}(B, y) = \max_{B'} u(y - B + q(B', y) B') + \beta \int_{Y} V(B', y') f(y', y) dy'. \tag{9}$$

The value function of defaulting, V^D, is the autarky value function, where $h(y) \leq y$ captures the presence of output costs of default, and θ is the exogenous probability of regaining access. When it reacesses international credit markets, the government is assumed to have no outstanding debt. The value function of repaying, V^{ND}, captures the optimal borrowing choice today plus the possibility of being able to choose to default or repay in the next period.

13. Bulow and Rogoff (1989).

14. See Wright (2002) and Kletzer and Wright (2000) for models that endogenize this assumption. Alternatively, see Amador (2003) for a model that generates suboptimal savings.

15. Aguiar and Gopinath (2006); Arellano (2008); Eaton and Gersovitz (1981).

Given that creditors are risk neutral and have access to a risk-free asset, the equilibrium bond price is given by

$$q = \frac{\Pr\left[V^{ND}(B, y) \geq V^{D}(y)\right]}{1 + r^{f}}. \tag{10}$$

The government will default if $V^D > V^{ND}$. While repaying implies transferring resources to foreigners that do not enter into the government welfare function, defaulting is also costly as it triggers sanctions imposed by foreigners. These sanctions generate output losses and the exclusion from credit markets. However, these output losses could also be generated by mechanisms other than sanctions. In that case, the decline in output could be interpreted as a reduced-form version of a more structural model in which a default causes a decline in output through mechanisms other than sanctions. The next two sections review these alternatives.

The Information Content of Default

The previous section presented a model in which the presence of sanctions created some exogenous costs of default in terms of output. However, the decline in output in the aftermath of a default could arise even in the absence of sanctions. This section describes a model in which the output costs derive from the information revealed by the default.[16]

The basic idea is that the repayment/default decision is a signal. For example, when Luiz Inácio "Lula" da Silva became President of Brazil, he decided not to default on Brazil's debt. The months prior to his election were characterized by a tremendous amount of uncertainty among investors and entrepreneurs (both Brazilian and foreign).[17] In particular, there were concerns about the new government's attitude toward issues such as property rights, privatization, and the business environment in general. Even the more optimistic observers worried about the Workers' Party ability to run an efficient government.[18] Once elected, President da Silva tried to dissipate these concerns, and debt repayment was an important component of that strategy. The government

16. See Cole and Kehoe (1998); Sandleris (2008).

17. The Brazilian stock market, exchange rate, and government debt reflected these concerns. From the beginning of 2002 until the elections in October, the Brazilian stock market index lost a third of its value, the nominal exchange rate depreciated more than 60 percent, and Brazil's sovereign risk soared to over 2,000 basis points.

18. See Gavin and Werneck (2002) for an example of investors' concerns during this period.

undertook a costly fiscal adjustment to be able to make its debt payments. Although not the only feasible explanation for this course of action, repaying foreign creditors was arguably one of the costly signals that da Silva's government had to convey in order to improve investors' and entrepreneurs' expectations. Had he chosen to default, the negative effect on expectations and the economy would have been substantial. Broadly speaking, this is a good example of the process that these information-based models try to capture.

The model presented here is based on my previous work.[19] The setup is similar to that of the two-period model presented earlier, with two main differences. First, in addition to the government and foreign creditors, the model incorporates foreign direct investors that contribute to output in time 1. Let

$$y_1 = e_1(\theta) + \gamma A(\theta) F(K), \tag{11}$$

where θ is the state of the economy (or alternatively could be interpreted as the government type), e_1 is the endowment received by domestic agents, $A(\theta)F(K)$ is the amount of output produced by foreign direct investors, and γ is the exogenously determined share of this output that goes to domestic agents.[20]

The second change with respect to the two-period model is the inclusion of private information.[21] The fundamental shock that will determine the endowment and the productivity of investment is only observed by the government.[22] At time 1, the government learns this information (that is, the economy's fundamentals) θ, while other agents in the economy only know the probablity distribution of the fundamentals: good ($\overline{\theta}$) with probability p and bad ($\underline{\theta}$) with probability $1 - p$. This assumption tries to capture

19. Sandleris (2008). In a similar vein, Cole and Kehoe (1998) argue that default costs arise outside the government/foreign creditor relationship, in other trust-based relationships in which the government could be involved, resulting in "reputation spillovers." However, their focus on reputation prevents them from articulating the more important and direct role that information and signaling could play.

20. The expression $\gamma A(\theta)F(K)$ is basically a reduced form of a more complicated model in which there is domestic and foreign production in the country, both of which use domestic inputs. The only relevant aspect of this assumption is that the amount of foreign investment affects domestic agents' welfare.

21. To highlight the informational channel, I assume that there are no sanctions or credit market exclusion following a default.

22. With some additional notation, the model could be adjusted so that both the government and the investors receive noisy signals about the fundamentals. The relevant assumption in such an environment for the results of the model to hold would be that the government's information is different and relevant for investors.

the fact that governments, particularly in developing countries, might have some private information that affects private sector actions. This information could be related, for example, to the government's ability or willingness to deal with corruption or to implement structural reforms that may enhance some fundamental institutions in the country, such as the respect for property rights or the rule of law.

After observing its private information, the government chooses whether to repay its debt with foreign creditors or to default. The government makes this decision knowing that foreign investors might update their beliefs from p to p' based on the government's action. Posterior beliefs, p', matter as they will affect the optimal amount of investment that foreign agents will undertake.[23]

Foreign investors solve the following problem:

$$\max_{K} E_1\left[(1-\gamma)A(\theta)F(K) - r^f K \middle| x\right],$$

where $x = D, ND$ is the government default decision. The first-order condition of this problem is standard and makes clear that if investors' beliefs about the fundamentals, θ, are more optimistic, the chosen level of investment will be higher and the domestic agents' budget constraint will be more relaxed and their welfare higher.

The government faces two decisions in the model. At time 0, it has to decide how much to borrow; at time 1, after receiving the private information, it has to decide whether to repay or default on the debt. Since international credit markets are perfectly competitive and foreign creditors are risk neutral, their expected return should be equal to the risk-free rate.

The presence of private information in the hands of the government is what makes defaults costly in this model. The information structure of the model is such that the government's repayment/default decision may act as a signal, revealing information to other agents about the fundamentals of the

23. The fact that investment takes place after the government makes its repayment/default decision is not a strong assumption, as there are a myriad of decisions that are influenced by fundamentals that are made almost all the time in the real world. Thus, there will always be some investment decisions made after the government's repayment/default decision. Sandleris (2011) presents a related model in which the costs derive from the default's effect on the amount of investment that credit-constrained domestic entrepreneurs can undertake. Better beliefs about the fundamentals may relax the domestic entrepreneurs' credit constraint. Andreasen (2011) presents a similar mechanism that works through the interest rate at which domestic entrepreneurs can borrow.

economy. A default may negatively affect foreign investors' beliefs about the economy's fundamentals, leading them to reduce their investment and thereby affecting welfare.

The cost of repaying is that it implies a transfer of resources to foreigners; the benefits are related to the potential impact that this action may have on investors' expectations. In this model, if repaying does not reveal any information, it will not affect foreign investors' beliefs and actions, in which case the government will always be better off defaulting on any outstanding debt. However, in the presence of private information, a separating equilibrium may arise in which for some levels of debt, the government will repay when fundamentals are good and default when they are bad. The intuition for this result is as follows. The productivity of capital is higher when fundamentals are better, so the output gains from affecting beliefs through repayment and stimulating higher levels of investment will be larger.[24] At the same time, the cost of repaying standard debt instruments is either invariant or decreasing in the fundamentals. This is what generates the single crossing property in the model. For a given level of debt, a separating equilibrium could arise in which a "good" government may choose to repay rather than default and suffer a decline in the output generated by foreign investors, while a "bad" one might choose the opposite since the decline in output would be smaller. For relatively lower levels of debt, there is a pooling equilibrium in which both the good and the bad governments would choose to repay. In equilibrium, foreign creditors will limit the amount of lending to the government, so that the government finds it optimal to repay at least for some realizations of the fundamentals. The interest rate on the government debt will reflect the default risk.

Repayment is one of the many possible signals that a government may undertake to influence expectations. However, communicating the information to the private sector (that is, just telling them) is usually not one of them. The reason is that the government faces a credibility problem. In the model, welfare is higher when the level of foreign direct investment (FDI) is higher, which, in turn, is positively related to beliefs about the government's private

24. Two effects need to be taken into account when analyzing how better fundamentals influence the effect of higher foreign direct investment on welfare. The first effect is a substitution effect—it is more convenient to have more foreign investment when fundamentals are good since it increases the country's productivity. The second effect, which appears with concavity, is a wealth effect—output is higher when fundamentals are good, so the welfare gain of having additional goods is smaller. The two effects work in opposite directions. In this setup, the first effect is assumed to dominate.

information. Thus, regardless of the realization of the private information, the government would generally like to induce the highest possible beliefs, if doing so is costless. An interesting characteristic of the model is that the presence of alternative costly signals might reduce welfare. If there are other signals, then the amount of repaying that the government could commit itself to make would be reduced, and creditors would therefore reduce the amount of lending, limiting the production of public goods.

In sum, a second type of default cost arises when defaults reveal information. This information could generate a decline in foreign investment as discussed in this section, but it could also lead to a decline in foreign credit or a credit crunch in domestic credit markets.[25]

Domestic Agents' Sovereign Bondholdings

The models presented above share the feature that only foreign agents hold sovereign debt. This is clearly not the case in reality. This issue is irrelevant if the government can perfectly discriminate between foreigner and domestic bondholders when defaulting or, alternatively, if it can perfectly engineer post-default bailouts, so as to avoid hurting domestic bondholders. If these two assumptions do not hold, a sovereign default will hurt domestic bondholders, thereby creating additional costs of default.

Broner and Ventura analyze the issue of nondiscrimination in the more general context of sovereign risk.[26] In a framework in which domestic agents can contract with other domestic agents and also with foreigners, they assume that the government can choose to enforce either both contracts or none, which creates sovereign risk, but it cannot choose to enforce one set of contracts and not the other.[27] Gennaioli, Martin, and Rossi apply the idea of nondiscrimination to sovereign borrowing, as does Alessandro.[28] They assume that some domestic agents hold sovereign debt, and the government is unable to discriminate in their favor when defaulting or to compensate them after the default. In both models the domestic agents holding the sovereign debt are banks. As a result, a default damages banks' balance sheets.

The Argentine crisis of 2001 and the European debt crisis that began in 2009 illustrate the effect of a sovereign debt crisis on banks' balance sheets.

25. Sandleris (2014); Andreasen (2011).
26. Broner and Ventura (2011).
27. See Broner, Martin, and Ventura (2010) for the microfoundations of this assumption.
28. Gennaioli, Martin, and Rossi (2014); Alessandro (2009). Guembel and Sussman (2009) apply this idea in a different setup.

In the Argentine crisis, banks' sovereign debt holdings were one of the factors that sparked the bank run, given the imminence of the sovereign default. In Europe, the downgrading of sovereign credit ratings and the heightened risk of sovereign default raised concerns about the solvency of Greek and other European banks because of their exposure to sovereign debt.

This subsection presents a very simple model that captures the intuition of Gennaioli, Martin, and Rossi.[29] The model is similar to the two-period model described earlier, but now there are two types of domestic agents: banks and entrepreneurs. Banks receive an endowment at time 0, e_0. Entrepreneurs do not receive an endowment at time 0, but they receive an investment opportunity at the beginning of time 1, which matures at the end of the period. Banks and entrepreneurs are risk neutral and derive utility from consumption in time 1.

The government borrows at time 0 to finance an investment opportunity of size I_g, which will generate $Y_g = A_g I_g$ at the end of period 0, where $A_g > 1$ and $I_g > e_0$. This last assumption implies that the government needs to borrow from both domestic banks and foreign creditors to finance its investment. At the beginning of time 1, the government has to decide whether to repay both foreign and domestic agents (banks) or to default on both. It cannot discriminate between them (that is, it cannot default on one and not on the other). As in the signaling model, there are no exogenous costs of default. Entrepreneurs' investment opportunity at time 1 is of size $I_E < e_0$. The investment will generate $Y_E = A(\theta)I_E$ at the end of the period. The productivity of investment, A, is determined by a random shock, θ, that occurs at the beginning of period 1: the shock is good ($\bar{\theta}$) with probability p and bad ($\underline{\theta}$) with probability $1 - p$. Assume $A(\bar{\theta}) > A(\underline{\theta}) - \varepsilon = 1$, with $\varepsilon > 0$ but arbitrarily small. The shock is public information. To finance their investment, entrepreneurs can only borrow from domestic banks. Government transfers that entrepreneurs may receive at the beginning of time 1 cannot be used for investment purposes. That is, only funds intermediated by banks can be used for investment.

As before, foreign creditors are risk neutral and operate in a competitive market, and the world interest rate is equal to one for simplicity. After observing the shock at the beginning of period 1, the government has to decide whether to repay or default. Repaying implies a transfer of goods to foreigners. Any remaining goods can be transferred to banks and entrepreneurs as a lump sum. If the government chooses to repay, it gives some resources to

29. Gennaioli, Martin, and Rossi (2014).

foreigners and some resources to banks, which can then lend to entrepreneurs and thus transform the resources into productive investment. A default, on the other hand, avoids the transfer to foreigners, but it also hurts banks' balance sheets, reducing the amount that they can lend to entrepreneurs. Depending on the value of the shock and the amount of debt held by banks and foreigners, the government will choose to repay or default.

The costs of a sovereign default in this framework arise through the effect of the default on domestic banks' balance sheets. A default damages the balance sheet and reduces the amount of lending that banks can undertake. In doing so, it reduces investment, output, and welfare. The key reason why defaults generate this effect in this model is that the government can neither discriminate between foreign and domestic bondholders when defaulting nor sufficiently compensate domestic agents after the default.

The Costs of Sovereign Default: The Empirical Evidence

Sovereign defaults are usually just one component of a more general economic crisis. As a result, the main difficulty in empirically analyzing the costs of sovereign default is to isolate their specific effects from those of the other events that tend to occur simultaneously. Most research on the topic controls for these other events, with a different degree of success. A second problem that arises when dealing with the effect of default on aggregate variables such as growth, trade, and investment is endogeneity. Again, the literature takes this into account, but problems remain. With these caveats in mind, this section discusses the empirical evidence on the costs of default.

To provide some perspective, the section opens with an examination of the relationship between sovereign defaults and GDP growth. The discussion is oriented toward gauging the significance and lag structure of default costs, rather than distinguishing between the different theories on the costs. This is followed by a look at some evidence on the channels through which these costs might occur. Following the empirical literature, the focus is on the effects of default on trade, foreign direct investment, and credit (both foreign and domestic) to the domestic private sector. Finally, I analyze the empirical evidence on what has usually been considered the reputational effects of default—namely, the evidence on exclusion from international credit markets in the aftermath of defaults and the effect of sovereign default on subsequent borrowing costs for the defaulting country.

TABLE 1. Real GDP Growth Rates during Sovereign Default Episodes, 1980–2010

Period	*Mean*	*Standard deviation*
$t-3$	3.06	4.89
$t-2$	1.97	4.59
$t-1$	1.10	6.25
t	–0.49	6.68
$t+1$	1.08	6.43
$t+2$	3.49	4.20
$t+3$	4.23	4.42
$t+4$	3.55	4.60
$t+5$	3.58	6.54
No. defaults	76	

Source: Author's calculations, based on data from Standard & Poor's and the International Monetary Fund, *World Economic Outlook*.

Sovereign Default and Output

As discussed above, there are three main mechanisms through which defaults become costly: sanctions, information revelation, and the effect on domestic bondholders. All three predict some output loss for the defaulting country, and, indeed, sovereign defaults are associated with output declines. Tables 1, 2, and 3 present summary statistics of the evolution of output in the years before and after a default on sovereign debt for countries that experienced a default in 1980–2010. The dates of the sovereign default events are taken from the Standard and Poor's (S&P) database; real GDP growth rates are from the World Economic Outlook (WEO) database maintained by the International Monetary Fund. Table 1 shows that output growth rates decline significantly in the year of the default, as well as in the years before and after the default. On average, real GDP growth declines by approximately 1.5 percentage points in the year prior to the default (relative to the average of the two previous years) and by 2.5 percentage points in the year following default (relative to the average of the subsequent two years). In the year of the default, GDP growth rates decline by an additional 1.5 percentage points.[30] Tables 2 and 3 present the same information dissagregated by decade and region, respectively.[31]

30. The standard deviation is very large, however, reflecting the substantial heterogeneity in growth performance during defaults.

31. The tables include only the default events for which GDP data are available for every year around them.

TABLE 2. Real GDP Growth Rates during Sovereign Default Episodes, by Decade

	1980–1990		*1991–2000*		*2001–2010*	
Period	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*
$t-3$	3.52	4.76	2.58	5.24	2.55	4.90
$t-2$	2.13	3.80	1.96	5.81	1.57	4.70
$t-1$	1.29	5.43	–0.67	7.11	3.47	6.48
t	–0.80	5.25	–1.77	8.63	2.46	6.16
$t+1$	0.82	5.97	–0.48	6.73	4.35	6.43
$t+2$	3.24	4.24	3.38	4.37	4.37	3.99
$t+3$	4.46	4.98	3.37	4.23	5.02	2.76
$t+4$	2.70	4.02	4.67	5.89	4.10	3.41
$t+5$	2.72	6.44	4.52	7.73	4.43	4.45
No. defaults	39		23		14	

Source: Author's calculations, based on data from Standard & Poor's and the International Monetary Fund, *World Economic Outlook*.

TABLE 3. Real GDP Growth Rates during Sovereign Default Episodes, by Region, 1980–2010

	Africa		*Asia*		*Caribbean*	
Period	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*
$t-3$	3.27	4.14	6.88	3.41	1.99	4.43
$t-2$	2.09	4.77	5.15	2.28	1.11	3.02
$t-1$	1.96	6.01	2.53	6.41	0.61	5.08
t	–0.73	6.03	2.98	5.81	3.27	4.79
$t+1$	0.04	7.79	1.54	3.97	3.79	5.42
$t+2$	3.40	4.44	2.21	3.75	2.53	3.69
$t+3$	3.88	4.61	3.49	5.03	3.46	2.09
$t+4$	3.89	5.37	3.20	3.73	1.90	2.22
$t+5$	5.41	6.21	1.47	8.69	1.43	4.94
No. defaults	32		11		9	

	Europe		*Latin America*	
Period	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*
$t-3$	–2.87	6.10	2.56	5.20
$t-2$	–1.43	7.68	1.24	4.28
$t-1$	–2.13	4.80	–0.09	7.36
t	–10.16	10.31	–1.34	5.42
$t+1$	–3.04	6.58	2.35	4.90
$t+2$	3.85	7.57	4.73	3.12
$t+3$	3.65	8.74	5.77	2.89
$t+4$	4.63	4.94	3.68	4.62
$t+5$	6.18	4.52	2.04	6.26
No. defaults	5		19	

Source: Author's calculations, based on data from Standard & Poor's and the International Monetary Fund, *World Economic Outlook*.

TABLE 4. Real GDP Growth Rates during Sovereign Default Episodes, with and without Banking Crises, 1980–2010

	Banking crisis		*No banking crisis*	
Period	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*
$t-3$	1.72	5.55	2.92	4.59
$t-2$	1.05	5.19	1.89	4.53
$t-1$	0.62	3.17	0.89	6.98
t	−2.74	4.35	−0.12	7.18
$t+1$	−0.41	6.44	1.86	6.34
$t+2$	4.15	4.76	3.34	4.25
$t+3$	5.89	4.24	3.74	4.03
$t+4$	4.79	2.57	3.57	4.93
$t+5$	5.12	4.48	3.36	6.76
No. defaults	15		54	

Source: Author's calculations, based on data from Standard & Poor's and the International Monetary Fund, *World Economic Outlook*. The banking crisis database was assembled by Laeven and Valencia (2008).

The fact that the decline in output begins before the default should not be surprising.[32] One explanation for this phenomenon is that as the possibility of default becomes more clear, the negative effects of default begin to operate through both the information and domestic balance sheet channels, even before the default occurs. Another explanation is that the decline in output is caused not by the default, but rather by some other shock that is triggering both the default and the economic slowdown.

The literature explores the evidence on the short-term effects of default on output.[33] Chuhan and Sturzenegger perform a parametric analysis of the relationship between sovereign defaults and growth.[34] Based on cross-section and panel growth regressions, they find that default episodes are associated with a reduction in growth of approximately 0.6 percentage point. If the default coincides with a banking crisis, the effect is much larger: growth decreases by 2.2 percentage points. Borensztein and Panizza follow a similar methodology, using an unbalanced panel that includes up to eighty-three countries for the 1972–2000 period.[35] They find that default is associated with a decrease in growth of 1.2 percentage points a year, on average. Table 4 presents some

32. Levy Yeyati and Panizza (2011) report similar findings using quarterly data. They argue that most of the decline in output occurs prior to the default.

33. The empirical literature does not analyze the long-term effects of defaults on potential growth.

34. Chuhan and Sturzenegger (2005).

35. Borensztein and Panizza (2009).

TABLE 5. Real GDP Growth Rates during Sovereign Default Episodes, External and Domestic Debt, 1980–2010

	Only external		*Only domestic*		*Both*	
Period	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*	*Mean*	*Standard deviation*
$t-3$	3.14	4.86	3.61	4.00	1.22	6.89
$t-2$	2.42	4.38	0.93	5.09	−0.46	5.52
$t-1$	1.29	5.96	1.04	9.02	−0.65	2.80
t	−0.21	6.46	−1.09	8.88	−2.18	4.66
$t+1$	1.62	5.99	−0.37	9.06	−1.56	4.68
$t+2$	3.47	4.14	2.54	4.69	5.41	3.97
$t+3$	3.94	4.56	4.44	3.76	6.77	3.86
$t+4$	3.04	3.82	5.59	7.92	4.88	2.99
$t+5$	3.27	5.98	3.72	10.19	6.38	2.92
No. defaults	59		11		6	

Source: Author's calculations, based on data from Standard & Poor's and the International Monetary Fund, *World Economic Outlook*.

nonparametric evidence on the effect of default on GDP growth rates, considering separately the case when the default occurs jointly with a banking crisis.[36]

Finally, table 5 distinguishes between defaults on external debt and domestic debt, according to the S&P classification. The table shows that GDP growth rates decline more when the default includes domestic creditors.

Effects on Trade, Foreign Direct Investment, and Credit to the Private Sector

This subsection analyzes the empirical evidence on the effects of sovereign default on the domestic private sector, in particular trade, FDI, and credit to the domestic private sector. All these variables are possible channels through which a default can affect economic activity. Any of the theories presented above can explain an effect on these variables, yet few empirical papers assess their relative importance.

Sovereign defaults are associated with a decline in trade for the defaulting country. Rose empirically documents this relationship and reports that sovereign defaults negatively affect trade between the defaulting country and the creditor countries affected by the default.[37] Rose's findings leave open the question of which mechanisms link sovereign default with the drop in trade.

36. A default and a banking crisis are defined as occurring together if the banking crisis took place at some point within $t-1$ and $t+1$, where t is the year of the default event.

37. Rose (2005).

To explore this relationship, Martinez and Sandleris study the cause of the trade decline in the aftermath of defaults.[38] In particular, they analyze the empirical plausibility of the main mechanism suggested in the sovereign debt literature, namely, trade sanctions. This is one of the very few papers to test empirically the relevance of one of the theories discussed above.

One problem with the trade sanctions argument is that in the aftermath of the 116 sovereign defaults with private creditors and 269 defaults with official creditors in the last thirty years, it is hard to point to a single case in which substantial, overt bilateral creditor-debtor trade sanctions have actually been imposed.[39] It is possible, however, that creditor countries have found a sub rosa approach to impose trade sanctions (through covert actions that disrupt or harass the defaulting country's trade). So, even if trade sanctions are not observed, one might be able to observe their effect on the defaulting country's trade.

Martinez and Sandleris look for evidence of two types of covert sanctions: bilateral and multilateral sanctions.[40] If in the aftermath of a default, the specific creditor countries affected by the default imposed trade sanctions, then bilateral trade with the affected creditor countries would record a significantly larger decline than trade with other countries. In the case of multilateral sanctions, the authors consider the possibility of punishment by a collection of all major creditor countries (not just those affected by the default). In this case, the maintained assumption is that if in the aftermath of a default, all creditors coordinate to impose trade sanctions, then trade should decline more with all creditor countries (not just those affected by the default) than with noncreditor or debtor countries. Finally, if the defaulting country's trade does not decline either bilaterally or multilaterally relative to trade with other countries, then they view this as evidence that sanctions are playing no substantive role in the evolution of that country's trade.

To disentangle a general decline in trade from a bilateral one, Martinez and Sandleris use a gravity equation of trade flows and add a default dummy variable that captures the bilateral effect (that is, an effect of default on bilateral trade between the defaulting country and an affected creditor country)

38. Martinez and Sandleris (2011).

39. Gunboat diplomacy that affected a defaulting country trade or revenues from trade was a relatively common practice before World War I though. It was used by creditors with Egypt in 1880 and Venezuela in 1902. Furthermore, the Dominican Republic's attempt to default led to an invasion of the U.S. Marines and a takeover of the country's customs revenue in 1905. Something similar happen to Nicaragua in 1911–12.

40. Martinez and Sandleris (2011).

and another dummy variable that captures the effects on overall trade. This is equivalent to looking for the existence of a bilateral effect after controlling for a potential general effect. They proceed likewise to disentangle the general from the multilateral effect.

Their results show that sovereign defaults are often associated with a decline in total trade for the defaulting country of approximately 3.2 percent a year in the first five years following the default. This decline is statistically and economically significant (the accumulated loss in trade reaches almost 16 percent in the five years after the default). Contrary to the prediction of the trade sanction argument, however, there seems to be no significant decline in bilateral trade between the defaulting country and defaulted creditor countries in the aftermath of a default. The decline in trade is mostly concentrated in bilateral relationships involving defaulting countries and noncreditor countries. There is also no multilateral effect after a default. These results show that sovereign defaults seem to have a negative impact on the defaulting country's trade, but trade sanctions do not seem to be the cause of these declines. Instead, the declines could be the result of any of the other sources of default costs discussed above.[41]

Fuentes and Saravia used a similar methodology to analyze the effects of a sovereign default on the amount of foreign direct investment (FDI) that the defaulting country receives.[42] They estimate the parameters of an equation that captures the main determinants of FDI from country *i* to country *j* and add a default dummy variable that captures whether country *j* defaulted in a given year (general effect) and another dummy variable that captures whether country *j* defaulted to country *i* in a given year. They find that a sovereign default reduces the amount of bilateral FDI received by approximately 0.05 percentage point.[43] A puzzling finding of their paper is that while FDI from countries affected by the default declines substantially, FDI from unaffected countries increases.

Another channel through which economic activity can be affected by a sovereign default is the tightening of external financial constraints for private

41. According to the sovereign borrowing literature, reputation or the information content of default could potentially cause a drop in trade, as could a mechanism through which a default affects the balance sheet of domestic agents. Alternatively, it could be argued that the decline in trade is not the result of the default, but rather stems from macroeconomic distress in the tradable sector that may be causing both the default and the decline in trade.

42. Fuentes and Saravia (2010).

43. The mean value of bilateral FDI flows to GDP is 0.07 percentage point in their sample; the median value is 0.001 percentage point.

firms. Arteta and Hale were the first to study empirically whether a sovereign default affects the ability of the defaulting country's private sector to access international credit markets.[44] Using microdata on private sector borrowing from international credit markets, they find that sovereign defaults are systematically accompanied by a decline in foreign credit to domestic private firms. After controlling for fundamentals, they find an additional decline in credit of over 20 percent below the country-specific average during the debt renegotiations, which persists more than two years after the restructuring agreement is reached. When they analyze different types of debt restructuring agreements, they find that the contraction in foreign credit to the private sector is smaller after agreements with commercial creditors as opposed to agreements with official creditors and that no contraction occurs after voluntary debt swaps and debt buybacks.

Gennaioli, Martin, and Rossi analyze the effect of sovereign default on financial activity in the defaulting country.[45] They build a panel of emerging and developed countries from 1980 and 2005 using aggregate data. They find that sovereign defaults are followed by large drops in aggregate financial activity in the defaulting country (a default generates a decline of 8.6 percent in private credit). The post-default credit crunch is stronger in countries where banks hold more public debt, which is consistent with the theory that the costs of default are related to the sovereign bondholdings of domestic agents, in this case banks. Finally, the credit crunch is stronger in countries with higher levels of financial development.

Exclusion from Credit Markets

One of the potential costs of default discussed earlier is the exclusion of defaulting governments from international credit markets for some time. For example, after the Dominican Republic defaulted in 1982, it did not regain access to international credit markets for more than twenty years. In contrast, Turkey immediately regained access after defaulting in that same year. Gelos, Sahay, and Sandleris and Alessandro, Sandleris, and Van der Ghote analyze whether lengthy exclusions from international credit markets are the rule or the exception.[46]

To study the duration of the exclusion, it is crucial to pinpoint with precision the year in which a government is able to regain access to the market.

44. Arteta and Hale (2008).
45. Gennaioli, Martin, and Rossi (2014).
46. Gelos, Sahay, and Sandleris (2011); Alessandro, Sandleris, and Van der Ghote (2011).

Both Gelos, Sahay, and Sandleris and Alessandro, Sandleris, and Van der Ghote use microdata on international bond issuances and borrowing through private syndicated loans from nondomestic banks by sovereign governments.[47] This data set, provided by Capital Data Bondware and Loanware, contains information on 2,053 individual bond issuances and 5,065 commercial bank syndicated loans to national governments (or with a government guarantee) from 150 developing countries between 1980 and 2000. To identify the default date, both papers use Standard & Poor's database on sovereign defaults on foreign-currency debt, as is standard in the literature. They identify 101 sovereign default episodes in the period.[48]

Gelos, Sahay, and Sandleris find that while being in default usually prevents a country from accessing the markets during those years, the probability of market access is not influenced by the frequency of a country's defaults.[49] They also find that a recent default, if resolved quickly, does not significantly reduce the probability of tapping the markets. Measuring the time elapsed between the start of a default episode and the date that access is regained, they obtain statistics about the distribution of exclusion periods across default episodes. The average length of the period from default to renewed access to international credit markets was four and a half years for the full sample period; it fell substantially in the 1990s. While governments that had defaulted on their debt in the 1980s were unable to access the market for four years on average, market exclusion averaged just two years in the 1990s.[50] Part of the exclusion period is during the default itself, when countries are typically unable to borrow. However, the evidence presented in the paper suggests that most countries quickly regain access after restructuring the debt.

Alessandro, Sandleris, and Van der Ghote perform a duration analysis to study the length of the exclusion.[51] Duration analysis assesses the probability of regaining access to the credit market in each period after the start of the default episode, given that access was not obtained before and regardless of

47. Gelos, Sahay, and Sandleris (2011); Alessandro, Sandleris, and Van der Ghote (2011).

48. Dias and Richmond (2010) also analyze the issue of credit market exclusion, but they use aggregate data on capital flows instead of microdata, which makes it more difficult for them to precisely pinpoint the date of market reaccess.

49. Gelos, Sahay, and Sandleris (2011).

50. This analysis faces an identification problem. In principle, a government's lack of borrowing after a default could be the result of creditors not wanting to lend (the supply side) or the sovereign not wanting to borrow (the demand side). Both Gelos, Sahay, and Sandleris (2011) and Alessandro, Sandleris, and Van der Ghote (2011) take a series of sequential steps aimed at minimizing cases of voluntary abstention (that is, lack of demand for credit).

51. Alessandro, Sandleris, and Van der Ghote (2011).

whether access will be obtained in the future. Whereas the approach used by Gelos, Sahay, and Sandleris requires an endpoint for each episode and can only incorporate positively resolved default episodes (where market access was regained), the duration analysis implemented by Alessandro, Sandleris, and Van der Ghote has the advantage of including both episodes in which market access has been reinstated and episodes in which it has not.[52] They find that countries have a 50 percent probability of regaining market access within four years of defaulting. They also find that countries either reaccess the markets in the first six years after a default or have to wait much longer to do it, and that political stability significantly increases the chances of regaining market access in any given period after the default. Comparing default episodes across decades, they find that it was easier to reaccess the markets in the 1990s than in the 1980s as long as the country did it quickly (in the first three years), but the probability of having been able to regain access within the first four, five, or six years was higher in the 1980s.

In summary, the duration of the market exclusion from the moment of default until the moment in which access to international credit markets is regained is not very lengthy, on average. Furthermore, the length of the exclusion seems to have diminished in recent decades.

Subsequent Borrowing Costs

There are two contrasting views on the effect of a sovereign default on subsequent borrowing costs for the defaulting country. The first is that a default will entail higher future borrowing costs; the second holds that markets have short memories and, as a result, a past default should not affect future borrowing conditions for the defaulting country once the default is settled.[53] Which view is right? This subsection reviews the empirical evidence on the effect of defaults on subsequent borrowing costs for the defaulting country.

After a debt restructuring has been concluded, borrowing costs tend to be higher than in normal times, even after controlling for fundamentals. This effect seems to be short-lived, however. Analyzing a sample of thirty-one emerging market countries in 1997–2004, Borensztein and Panizza find that

52. Gelos, Sahay, and Sandleris (2011); Alessandro, Sandleris, and Van der Ghote (2011).

53. Supporters of the latter view tend to argue that markets are forward-looking. However, these are two different things. Markets might be forward-looking, yet a defaulting country may still face higher borrowing costs. This would be the case when defaults act as a signals, to the extent a previous default might provide information about characteristics of the government or the country that could affect the perceived likelihood of a new default occurring in the future.

in the year after a default, spreads are about 400 basis points higher than in tranquil periods, but this premium falls to 250 basis points in the second year, losing statistical significance and disappearing in the following years.[54] Flandreau and Sussman find a similar pattern for the 1880–1914 period: default episodes are associated with an increase in spreads of approximately 90 basis points in the year after the episode, but the effect of the default dies out very rapidly.[55]

Several papers study the effect on borrowing costs over longer periods of time. Eichengreen and Portes study the effect of defaults in the 1930s on borrowing conditions in the 1980s.[56] They find little evidence that countries that defaulted in the 1930s suffered inferior capital market access in the later period. Lindert and Morton arrive at a similar conclusion in their analysis of defaults before and after 1940 and their effect on borrowing costs in the 1970s.[57] In contrast, Ozler finds that defaults declared in the 1930s or in the postwar period had an impact on the interest rate charged to these countries in 1968–81, although the amount does not appear to be economically significant (on the order of 25 and 40 basis points, respectively).[58] Benczur and Ilut report similar results for a panel data sample of bank loans to thirty-seven developing countries in 1973–81.[59]

Finally, Cruces and Trebesch build a new database on the magnitude of the haircuts (or investor losses) in most sovereign default events in recent decades.[60] Using these data, they find that the effect of a default on subsequent borrowing costs depends on the magnitude of the haircut: larger haircuts entail higher subsequent borrowing costs. Even when taking this into account, however, the effects seem relatively small.

Overall, these findings do not lend much support to the idea that a sovereign default generates significantly higher costs in subsequent borrowing. The effects of a default on borrowing costs seem small and short-lived. Thus, losing reputation with international credit markets does not seem to be an important cost of default.

54. Borensztein and Panizza (2009).
55. Flandreau and Sussman (2004).
56. Eichengreen and Portes (1989).
57. Lindert and Morton (1989).
58. Ozler (1993).
59. Benczur and Ilut (2011). See Panizza, Sturzenegger, and Zettelmeyer (2009) for a more detailed review of the empirical evidence.
60. Cruces and Trebesch (2013).

Conclusions

Despite the weak legal framework in which sovereign borrowing takes place, sovereign defaults are costly for the defaulting country. The theory suggests three potential sources of the cost of defaults. First, foreign creditors impose sanctions in response to a default. This is the traditional explanation for default costs, namely, the exclusion of the defaulting government from credit markets and other actions that creditors could take, such as trade sanctions, which imply output losses for the defaulting country. Second, a default could reveal negative information about the government or the fundamentals of the economy, causing foreign investors to reduce their investments in the country. Third, if domestic agents hold sovereign debt and the government cannot discriminate in their favor when it defaults (or compensate them adequately afterward), a default could generate costs for the domestic economy. Despite these costs, in these models governments default on their debt because the alternative is even more costly.

The empirical evidence suggests that the costs generated by traditional mechanisms, such as trade sanctions or exclusion from credit markets, have not been significant in recent decades. Rather, information revelation and the effects on domestic debt holders, particularly the banking system, seem to be the main costs of sovereign defaults. Governments usually repay their debts to avoid these costs.

This conclusion could generate important policy implications. For example, banking regulations commonly allow banks to use government bonds to meet their reserve requirements, as they are considered risk-free assets. This appears to be a mistake, as it gives the banks incentives to hold too much debt and thus makes defaults more costly when they occur. This issue merits further reaserch.

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