COMMENTARY: MONETARY UNIONS AND FISCAL CONSTRAINTS

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The Fiscal Commission Working Group (FCWG) has proposed a monetary union between an independent Scotland and the rest of the UK based on the size of their respective populations. We have argued on several occasions that debt is the critical issue to consider when assessing the various currency options for an independent Scotland. If Scotland takes on a population share of the existing UK government debt, we have also argued in favour of Scotland adopting its own currency. Nevertheless, on this occasion we put this view aside and simply examine the proposals of the FCWG. We challenge the conventional wisdom on the desirability of fiscal constraints and a banking union to underpin a monetary union between an independent Scotland and the rest of the UK.

Fiscal constraints in a monetary union can be seen as a substitute for a lack of political union. In the Eurozone, policymakers' faith in fiscal constraints seems to have strengthened, despite the failure of the old rules. The new Fiscal Compact requires governments to enact national laws which ensure that government finances are 'balanced or in surplus'.[1] Requiring uniform fiscal policy by law is one step closer to mimicking a political union. In the US, which is a political and monetary union, there are no fiscal constraints imposed on states by the Federal government. Most states chose to adopt their own balanced budget laws.

In the Scottish independence debate both sides consider that fiscal constraints – limits on deficits and debt levels – would be necessary for a successful monetary union between an independent Scotland and the rest of the UK.

> "It is clear that appropriate fiscal constraints would be needed in a formal monetary union between an independent Scottish state and the continuing UK." HM Treasury (2013), *Scotland Analysis, Currency and Monetary Policy*, p. 64.

> "...a monetary framework will require a fiscal sustainability agreement between Scotland and the rest of the UK, which will apply to both governments and cover overall net borrowing and debt." Scottish Government (2013), *Scotland's Future*, p. 117.

We show that the case for fiscal constraints does not necessarily apply when the countries in a monetary union are very different sizes. To be clear, we argue that the necessity of fiscal constraints put forward by both sides of the independence debate (quoted above) is wrong. We show that the UK should have no interest in imposing any fiscal constraint on an independent Scotland in a monetary union. An independent Scotland might, however, benefit from putting a fiscal constraint on the UK. In the world of Realpolitik, we doubt the latter is going to happen. Indeed, we argue that introducing unnecessary fiscal constraints is more likely to invite moral hazard and a perception of joint bail-out responsibility.

Political union, relative size and currency arrangements
The main rationale for fiscal constraints on members of an international monetary union is to impose fiscal discipline to prevent over-borrowing that could pressure the central bank into accommodating the fiscal largesse.[2] Excessive accommodation could undermine the common currency. Von Hagen and Eichengreen (1996) envisage two ways this could occur.[3] First, the monetary authority could accommodate by inflation, keeping interest rates down to reduce the real cost of servicing a large debt burden. Second, accommodation could occur when a central bank is called upon to bail out a government. We know

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from the Eurozone crisis that a bail-out may be necessary because of over-borrowing in the banking sector which then becomes government sector debt.

The logic extends to the idea of a banking union with a shared fiscal backstop and national regulators. Pooling residual banking sector risk in a banking union of many countries of similar size may make sense. However, we show that a banking union between two countries of such different size may not be sustainable as there is no incentive to participate. Allowing for cross-border banking and the usual Lender of Last Resort arrangements for foreign banks in the UK, the next best response may be to avoid any special arrangements which could invite the perception of joint bail-out responsibility.

Following this argument, a monetary union between two sovereign states of such different size may not warrant fiscal constraints or a banking union. The currency arrangement for an independent Scotland would resemble an informal currency union or 'dollarization' using sterling.

Over-borrowing, inflation and fiscal constraints

The standard argument in favour of fiscal constraints is to protect against excessive inflation due to over-borrowing by members of a monetary union. We use the two-period framework of Chari and Kehoe (2004) and develop the case for fiscal constraints in a monetary union of equals by showing the sub-optimal outcome of a monetary union without fiscal constraints. Over-borrowing arises when each country neglects the spillover effects of their own borrowing leading to higher inflation for all other members of the monetary union. If instead all countries took the consequences of their borrowing decisions on union-wide inflation into account, each country would borrow less. Fiscal rules are a means to implement this low-borrowing, low-inflation outcome. We will then go on to show that the case for fiscal constraints breaks down in the case of unequally sized nations, such as the UK and Scotland. A formal summary is presented in Appendix A.

The model set-up supposes that each of the similarly sized national governments in the monetary union chooses its own fiscal policy and has a vote on the union-wide monetary policy decision. Easier monetary policy has two opposing effects: (a) reducing the real burden of government debt; and (b) reducing the real value of output across the union. Higher borrowing today implies higher consumption today and the real cost of borrowing could be reduced by voting for easier monetary policy in the future. The lower level of real income in future means that there is a trade-off from choosing higher inflation, rather than a bias towards ever-higher inflation.

When a nation votes in favour of easier monetary policy to accommodate its over-borrowing it imposes a cost, or externality, on the rest of the union which also suffers from the lower real income. The failure of each nation to internalise, or take into account, the implications of voting for easier policy on the rest of the monetary union members leads to lower overall social welfare. In the Eurozone, each national central bank governor is expected to vote in the interests of the union rather than their own nation to avoid precisely this outcome.

If the monetary union committee could credibly commit to take decisions only in the interests of the whole union, or it was run by a benevolent dictator, known to economists as the social planner, or if there was a political union, the committee would not respond to over-borrowing. Without a political union or a social planner, the next best alternative is to seek to prevent national governments from over-borrowing by introducing fiscal constraints. Note that this does not change their incentive to over-borrow; it only tries to prohibit them from doing so.

Fiscal constraints in a sterling zone

Now let us consider a possible monetary union between two sovereign nations of very different size: the UK and an independent Scotland. The population of the rest of the UK is more than ten times the size of Scotland's population. The key issue is the interests of those taking monetary policy decisions. The FCWG proposes that the Bank of England could be structured on a shareholder basis reflecting relative populations.[4] This suggests that one member of the Monetary Policy Committee (MPC) might represent Scottish interests and the eight other members represent the rest of the UK. The MPC would have a permanent majority of eight to one in favour of setting monetary policy in the interests of the rest of the UK.

When the Scottish government chooses its borrowing, it would do so knowing that it cannot influence monetary policy for Scotland. There would be no temptation to over-borrow, in the sense that it could not expect any over-borrowing to be accommodated. On the other hand, when the UK government chooses its fiscal policy it may influence the decision of the MPC and therefore inflation conditions in an independent Scotland. Of course the MPC has operational independence to achieve an inflation target, but the Chancellor sets the target each year. One of the supposed benefits of quantitative easing has been to keep long-term interest rates low, even during a period of consistently above target inflation.[5]

It follows that an independent Scotland should wish to impose fiscal rules on the rest of the UK. But the UK has

no reason to particularly care about the fiscal policy of Scotland any more than for any other country outside of the UK. If the rest of the UK sets monetary policy without taking Scotland's interests into account, then there is no guarantee that this monetary policy will be appropriate for an independent Scotland.

If there is a rationale for fiscal constraints on the UK, and supposing that they could be made binding, might an independent Scotland accept bilateral constraints to protect its own interests? The problem is that the UK would have no incentive to engage as they know the constraints on Scotland would be worthless. Moreover, agreeing to a (worthless) constraint may invite the perception of culpability and therefore an expectation of a bail-out if necessary. This perception may lower borrowing costs and undermine the very market discipline designed to prevent over-borrowing by Scotland. Even a perception of possible support might therefore be counter-productive (see Lane, 1991).

The fiscal coordination problem of a monetary union with many nations and equal voting power seems to have been anticipated in the design of the Eurozone. Inflation was generally kept low and most countries, at least, operated within the fiscal constraints of the Stability and Growth Pact. It was the largest and most influential countries, France and Germany in 2002, which violated the fiscal constraints rather than the smaller countries.

Over-borrowing, banking unions and regulation

Fiscal constraints may prohibit governments from over-borrowing, but they do not change their incentives. There is plenty of evidence that governments can provide 'pseudo' fiscal stimulus without it appearing on fiscal accounts. Off-balance-sheet transactions, for example PFI contracts or Help to Buy, are notorious for getting around constraints and there is a long history of indirectly influencing banks whether by announcing home ownership ambitions, subsidising risky borrowers or light-touch regulation. As Von Hagen and Eichengreen (1996) had predicted, many countries in the Eurozone were bailed out, only the cause was over-borrowing by banks rather than governments.

The EU and IMF now believe that the financial architecture of the Eurozone was incomplete and a banking union is a necessary component of a stable monetary union.[6] Whether this argument is valid is not addressed here. The motivation for a banking union is to break the destructive feedback loop between banking sector risk and sovereign debt risk: governments suffered as they absorbed impaired banks, and imprudent governments could not backstop their banks. A core part of the Statutory Resolution Mechanism is an ex ante pool of resources from Eurozone countries that could be used to cover any residual losses from insolvent banks in the union.

Pooling makes sense if the risks are idiosyncratic (they do not all arise together), the behaviour of each member can be closely monitored and the future benefits of being in the pool outweigh any possible outlay for each member. The ex ante pooling of risks of eighteen Eurozone states may satisfy these conditions if the rest of the banking union can be implemented. In particular, the Single Supervisory Mechanism with one rulebook has parallels with the fiscal constraints discussed above. The aim is to prevent building up excessive risk and therefore an overly burdensome claim on the pool of funds.

Banking union in a sterling zone

Would a banking union make sense in a monetary union between the UK and an independent Scotland? For loss sharing in a banking union there must be some pooling of risks. Simply allocating a loss to the home nation is easier without a union but would not reduce the feedback loop between sovereign and bank debt. Loss sharing implies the possibility of fiscal transfers between sovereign countries. If a Scottish bank were to fail, there would be a transfer from the UK, and if a UK bank were to fail, there would be a transfer from Scotland. The critical question is whether a banking union between two sovereign nations of such different sizes is worthwhile.

The FCWG suggest a loss-sharing model based on their proposition of a shareholder model for the Bank of England.[7] This is a full risk-sharing model in the sense that both countries have the same loss in per capita income. This is illustrated in Appendix B. A necessary condition for the banking union is that it leaves both nations at least as well-off as if they did not participate. This is the participation constraint, which is often satisfied when there are many nations with similar size risks. But of course the rest of the UK is more than ten times bigger than Scotland. If a future banking sector loss is equally likely north and south of the border and proportionate to the size of their economies, the transfer from Scotland would be ten times greater than from the UK.

Appendix B presents a numerical example to show how, with reasonable parameters, loss sharing could violate Scotland's participation constraint. The greater the size of the risk and the more frequent its possible occurrence, the less incentive for an independent Scotland to participate. This suggests that it may not be in Scotland's interests to pool large systemic risks, precisely the risks

that a banking union is supposed to mitigate. Because the rest of the UK would know that it would be in an independent Scotland's interest to simply walk away in the event of a large claim, an agreement is unlikely to be struck.

In this example, we assume that the prospective losses to banking crises are the same proportionate size to output in both states. If some large banks were to re-domicile their headquarters south of the border this would make the banking union even less worthwhile for an independent Scotland.

If there were no banking union what might this imply for financial stability? Of course, Scottish banks operating in the UK would be treated equally to other foreign banks in the UK in standard Lender of Last Resort operations. The terms of these operations depend on the collateral posted. However, if events deteriorate and there becomes a risk of a capital loss, then it would be for the UK Chancellor to decide whether to provide UK taxpayer support. This may lead banks that are too large for the Scottish tax base to migrate, making a banking union even less viable. This may, of course, be an efficient allocation of risk and so the market discipline should be permitted.

From monetary union to 'dollarization'

There are many different unions discussed in the context of sovereign states including economic, fiscal, monetary, currency and banking unions. However, political union may have primacy, because it raises the cost considerably of either party walking away from other forms of unions. In the absence of a political union, other forms of union become subject to participation constraints, as the barriers to leaving them are much diminished. We have argued that participation constraints may be even more important when countries are significantly different in size. In particular, because the UK and an independent Scotland would be so different in terms of size it may be difficult to justify fiscal constraints or banking union.

In practice, a monetary union with neither fiscal constraints nor a banking union would resemble the so-called 'dollarization' currency option. This would be a deliverable and stable outcome of negotiations by two sovereign states acting in their own interests. Whether the outcome provides a stable currency regime for an independent Scotland is another question entirely. As we have seen, when using the currency of another country with a high debt burden governments may also need a lender of last resort (see Armstrong and Ebell, 2014).

NOTES

1 The Treaty on Stability, Coordination and Governance in the Economic and Monetary Union.
2 At the time of the creation of the Eurozone another motivation for fiscal constraints was to mitigate the possible risk of large public sector deficits in one country influencing the real interest rate in other countries. The idea was that over-borrowing in one country could cause an externality on the financing conditions, and therefore crowding out of activity, for other members of a monetary union.
3 Von Hagen and Eichengreen (1996) refer to the two mechanisms as ex ante and ex post.
4 The FCWG also proposed a new supra-national central bank with the Bank of England and Central Bank of Scotland as equal members.
5 In the 2013 *Budget* the Chancellor amended the inflation target in the context of 'monetary activism'.
6 This was also asserted by Governor Carney in his speech in Edinburgh on 29 January 2014.
7 FCWG (2013), p. 191.
8 The monetary authority maximises an equally weighted sum of utilities across all member states. This equal-weighting is appropriate either if all countries are similarly sized, or if each member country has equal weight in the monetary policy decision-making process.
9 This is consistent with the very similar levels of GDP per capita in the rest of the UK and Scotland.
10 See FCWG (2013), p. 191, paragraph 9.56.
11 In the example, we set the discount factor β to 0.99. We also assume a standard CRRA utility function $U(C) = \frac{C^{1-\gamma}}{1-\gamma}$, where the constant relative risk aversion parameter γ is set to 5. Lower values for either risk aversion γ or the discount factor β make it even harder for the participation constraint to be fulfilled, as they reduce the future value of being insured.

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Appendix A. Fiscal Rules and Inflation Externalities, based on Chari and Kehoe (2004)

The argument for fiscal rules is based on a model in which each government agrees a period 0 debt level b_i and a period 1 repayment x_i with lenders. The monetary authority then chooses inflation in period 1 to maximise union-wide welfare from consumption.[8] The monetary authority solves:

$$\max_{\pi} \frac{1}{I} \sum_{i=1}^{I} U(c_{i,1}) = \max_{\pi} \frac{1}{I} \sum_{i=1}^{I} U\left[y(\pi) - \frac{x_i}{\pi} \right]$$

Inflation π reduces real output ($y_{\pi} < 0$), but also reduces the real burden of repayments $\dfrac{x_i}{\pi}$. The monetary authority sets inflation to satisfy its first order condition:

$$\frac{1}{I} \sum_{i=1}^{I} U'(c_{i,1}) \cdot \left[y_{\pi} + \frac{x_i}{\pi^2} \right] = 0$$

As inflation is assumed to reduce real output, the monetary authority's optimal inflation level is increasing in the debt level of each of the identically sized countries. This also means that the monetary authority's optimal inflation choice will be increasing in the debt levels of all countries, formally

$$\pi = \pi(x_1, x_2, \ldots x_I) = \pi(\bar{x}), \text{ with } \frac{\partial \pi(\bar{x})}{\partial x_i} > 0.$$

Now consider an individual member country's debt choice at date 0. Lenders will agree to any debt contract that guarantees zero profits: $b_i = \beta \dfrac{x_i}{\pi(\bar{x})}$, where b_i is country i's date 0 borrowing, x_i is its nominal repayment at date 1,

and $\pi(\bar{x})$ is the monetary authority's inflation policy. Each government will choose the debt level which maximises its own country's utility from consumption at dates 0 and 1.

$$\max_{x_i} U(c_{i,0}) + \beta U(c_{i,1})$$

subject to its budget constraints

$$c_{i,0} = \omega_i + b_i = \omega_i + \beta \frac{x_i}{\pi(\bar{x})}$$

$$c_{i,1} = y(\pi(\bar{x})) - \frac{x_i}{\pi(\bar{x})}$$

where consumption in period 0 is the sum of country i's endowment ω_i and its borrowing b_i, and consumption in period 1 is production $y(\pi(\bar{x}))$ net of debt repayments $\dfrac{x_i}{\pi(\bar{x})}$. Each government understands that the monetary authority is setting inflation as a function of the debt levels of all countries, so that inflation is a function of $\bar{x} = (x_1, x_2, \ldots x_i, \ldots x_I)$. The government of country i chooses debt to satisfy its first order condition:

$$U'(c_{i,0}) - U'(c_{i,1}) = \frac{x_i}{\pi(\bar{x})} U'(c_{i,0}) \frac{\partial \pi(\bar{x})}{\partial x_i}$$

The smaller is the difference in marginal utilities $U'(c_{i,0}) - U'(c_{i,1})$, the larger is consumption at date 0 relative to date 1, and hence the greater is the borrowing at date 0.

In contrast, to achieve the first best, all governments would need to set policy cooperatively, maximising their welfare jointly, as would be the case with full political union. In this first best case, the impact of each country's borrowing on the inflation rate faced by all other countries is taken into account.

$$\max_{(x_1, x_2, \ldots x_i, \ldots x_I)} \frac{1}{I} \sum_{i=1}^{I} U(c_{i,0}) + \beta \, U(c_{i,1})$$

If all countries are equally sized and symmetric, then the joint first best choice of debt satisfies:

$$U'(c_{i,0}) - U'(c_{i,1}) = I \frac{x_i}{\pi(\bar{x})} U'(c_{i,0}) \frac{\partial \pi(\bar{x})}{\partial x_i}$$

Comparing the two optimality conditions makes it clear that in the non-cooperative fiscal policy case, date 0 consumption – and hence the representative country's debt – will be larger than the first best, as the gap between marginal utilities will be larger in the cooperative case.

The model with symmetric countries implies that monetary union together with fiscal disunion is suboptimal, as it leads to excessive borrowing. Fiscal limits are a way of forcing the members of a fiscally disjoint monetary union to behave in line with the first best, as the borrowing limits can be set so that each country's borrowing is not allowed to exceed the first best optimal level.

Fiscal rules in a sterling zone

The argument begins to break down, however, when the countries are asymmetrically sized. If monetary policy is exclusively determined by the economic imperatives of the larger country, the inflation externality of the small country onto the large country is eliminated, as the small country has no impact on the large country at all. However, this also amplifies the inflation externality of the large country onto the smaller country.

To show this formally, we adapt Chari and Kehoe's (2004) model to the Sterling Zone, assuming that the rest of the UK monetary authority would not take Scotland's welfare into account when setting monetary policy. In the model, the Bank of England would solve:

$$\max_{\pi_{UK}} U(c_{UK,1}) = \max_{\pi_{UK}} U\left[y_{UK}(\pi_{UK}) - \frac{x_{UK}}{\pi_{UK}} \right]$$

That is, in the model the BoE would only consider the impact of the inflation rate in lowering the real debt repayments $\frac{x_{UK}}{\pi}$ for the rest of the UK, and would ignore its impact on Scotland.

Scotland might, however, wish to impose fiscal constraints on the UK. Scotland would be subject to the inflation rate set by the UK. If the Scottish government has the same objective as the governments in our model, it would solve

$$\max_{x_s} U(c_{s,0}) + \beta \, U(c_{s,1}) = \max_{x_s} U\left(\omega_s + \beta \frac{x_s}{\pi_{UK}} \right) + \beta \, U\left(y(\pi_{UK}) - \frac{x_s}{\pi_{UK}} \right)$$

Would the UK's monetary policy be appropriate for Scotland? Formally, Scotland's optimal choice of inflation (were it allowed to choose) would satisfy:

$$U'(c_{s,1}) \cdot y_{\pi_{UK}} \frac{(\pi_{UK})^2}{x_s} = U'(c_{s,0}) - U'(c_{s,1})$$

This is the first order condition of the Scottish government for UK inflation, and characterizes its preferred inflation rate. Recall that $y_{\pi_{UK}}$ is negative (output is decreasing in inflation). As a result, Scotland's preferred inflation rate is decreasing in the gap between marginal utilities at dates 0 and 1, and hence increasing in its own borrowing. This echoes the logic of the previous section's model on monetary union among equals. However, there is no reason for the UK to set debt and therefore inflation levels which match Scotland's debt choice, so Scotland might have an interest in imposing fiscal constraints.

Appendix B. Risk-sharing and participation constraints, based on Ljungqvist & Sargent (2012)

A banking union among two sovereign countries is subject to participation constraints for both sides. Each country must find it in their interest to stay in the union, even when recapitalising the other country's banks. To show whether this condition is satisfied when countries and/or banking sectors are different sizes, we set up a simple risk-sharing model with participation constraints. Suppose there are two possible states for a banking system: normal or in crisis. In normal times, no transfers are required and each country consumes its own output of Y_N per capita which is normalised to $Y_N=1$ for both countries.[9] Since population in the UK is roughly ten times larger than in Scotland, in normal times total GDP and population for the rest of UK and Scotland is $11=10 \cdot Y_N + 1 \cdot Y_N$.

In a crisis the loss of bank capital, or the cost of recapitalisation, is X per cent of GDP, leaving output for consumption of $Y_C = 1-X$ per capita. How would the costs of recapitalising banks be divided across countries? We follow the FCWG (2013) suggestion that costs be shared on a per capita basis.[10] We show that in our simple model, this is equivalent to full insurance where losses would be shared equally by citizens in both countries.

Suppose a banking crisis were to hit the rest of the UK: its total GDP would fall to $10 \cdot (1-X)$. If Scotland were in normal times, total GDP for both the rest of the UK and Scotland would fall to $11-10 \cdot X$. The FCWG proposal is that the loss to Scottish banks should be shared equally by citizens in the UK and Scotland, so that Scotland would transfer $\frac{1}{11}$ of the cost of recapitalisation or $\frac{10}{11}X$ to the UK, while the UK would bear $\frac{10}{11}$ or $\frac{100}{11}X$ of the cost. For example, if X were 10 per cent of GDP, this would imply that each Scot would give up 9 per cent of her GDP, and each resident in the UK would receive a transfer of 1 per cent of his GDP. Clearly a transfer of 9 per cent of GDP per capita is a considerable cost. An independent Scottish government would have the choice between making the transfer and staying in a banking union or refusing the transfer and leaving the union.

Which option the Scottish government would prefer depends on how highly it values the insurance of the banking union. Imagine that the government expects a crisis every T years, so that the probability of a banking crisis in any one year is $p = 1/T$. In the numerical examples, we allow the frequency of banking runs to vary between approximately once a decade and every five decades, so that $p \in [0.02, 0.10]$.

Each government assesses the expected utility of leaving the union (out) at each date. The country which is due to pay the transfer – Scotland in this case – would be more likely to prefer to leave, so we check its participation constraint first. The expected utility to the Scottish government from not paying the transfer to the UK, and of leaving the union would be:

$$V_{OUT} = U(1) + \sum_{t=1}^{\infty} \beta^t [pU(1-X) + (1-p)U(1)]$$

This utility from leaving the union must be compared to the utility from paying the transfer today staying in the union. At each date, the probability of only one country being in a banking crisis would be $p \cdot (1-p)$, while the probability of both countries being in a banking crisis would be p^2, and the probability of both countries being in normal times would be $(1-p)^2$. The expected utility from bailing out the UK and remaining in the banking union would be:

$$V_{IN} = U\left(\frac{11-10X}{11}\right)$$
$$+ \sum_{t=1}^{\infty} \beta^t \left[p(1-p)U\left(\frac{11-10X}{11}\right) + p(1-p)U\left(\frac{11-X}{11}\right) + p^2 U(1-X) + (1-p)^2 U(1) \right]$$

When faced with contributing to recapitalise the larger country's banking sector, the smaller country would find it preferable to abandon the banking union whenever $V_{OUT} > V_{IN}$.

In table B1, we first show for two equally sized countries that as the probability of banking crises and the size of the loss increase, then the value of the banking union rises, creating the incentive to remain in the union. The banking union is particularly appropriate for insuring large systemic crises, which may break the link between banks and sovereigns. In table B2 we show the opposite result for a small country in an asymmetric union. The more likely the banking crisis and the larger the loss, then the smaller is the value of remaining in the banking union, and the rational option is to leave the union.[11] This would also be clear to the larger country. Therefore, the UK would be unlikely to enter into a banking union with a much smaller Scotland as it is unlikely to reap the benefits of the insurance, but would be on the hook for recapitalising Scottish banks.

Table B1. Excess utility from staying in the banking union, $V_{IN} - V_{OUT}$ for equally sized countries, for varying probabilities of crisis p and costs of recapitalising banks[a]

Annual probability of crisis %	Size of loss due to crisis, % of GDP				
	1	2	5	8	10
2	−0.005	−0.009	−0.020	−0.024	−0.024
4	−0.005	−0.008	−0.013	−0.005	0.008
6	−0.004	−0.007	−0.006	0.013	0.039
8	−0.004	−0.006	−0.001	0.031	0.068
10	−0.004	−0.006	0.006	0.047	0.096

Note: (a) A negative entry indicates that each country prefers to leave the banking union when faced with a crisis in the other country. Positive entries, in red, indicate that the banking union would be stable for equally sized countries.

Table B2. Excess utility from staying in the banking union, $V_{IN} - V_{OUT}$ for the small country, for varying probabilities of crisis p and costs of recapitalising banks[a]

Annual probability of crisis %	Size of loss due to crisis, % of GDP				
	1	2	5	8	10
2	−0.026	−0.052	−0.139	−0.238	−0.312
4	−0.041	−0.084	−0.223	−0.382	−0.500
6	−0.056	−0.114	−0.304	−0.520	−0.680
8	−0.070	−0.143	−0.381	−0.652	−0.852
10	−0.084	−0.171	−0.455	−0.777	−1.016

Note: (a) A negative entry indicates that the small country prefers to leave the banking union when faced with a crisis in the large country.