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RISK SHARING BY FINANCIAL MARKETS IN FEDERAL SYSTEMS: WHAT DO WE REALLY MEASURE?

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ABSTRACT

This paper criticises the standard methodology used to measure the importance of different channels of risk sharing in federal states such as the one used in Asdrubali et al.'s (1996) seminal contribution. It argues that the methodology chosen in these papers systematically underestimates the role federal governments play in stabilizing the business cycle in its member states (and overstates the role of financial markets in stabilization) as it a) ignores the possibility of direct spending by the federal government in a single state stabilizing state GDP, b) strips out effects of transfers and grants in national recessions, c) counts smoothing of distributed profits by domestic firms as "smoothing by capital markets" and d) counts a normal variation of households' savings to smooth consumption as "smoothing by credit markets".

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Risk sharing by financial markets in federal systems: What do we really measure?

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Abstract

This paper criticises the standard methodology used to measure the importance of different channels of risk sharing in federal states such as the one used in Asdrubali et al.'s (1996) seminal contribution. It argues that the methodology chosen in these papers systematically underestimates the role federal governments play in stabilizing the business cycle in its member states (and overstates the role of financial markets in stabilization) as it a) ignores the possibility of direct spending by the federal government in a single state stabilizing state GDP, b) strips out effects of transfers and grants in national recessions, c) counts smoothing of distributed profits by domestic firms as "smoothing by capital markets" and d) counts a normal variation of households' savings to smooth consumption as "smoothing by credit markets".

Keywords

European Monetary Union; Income Insurance; International Capital Markets; International Integration; Risk Sharing

JEL-Classification

F15; F36; F45; G15

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1 Introduction

One of the most widely cited paper in the discussion about a reform of the euro-area architecture is Asdrubali et al. (1996). In their original contribution, the three authors have tried to examine which part of a given shock to a single state in the U.S. federal system during the time of 1963-1990 has either been smoothed by capital markets, smoothed by credit markets, smoothed by the federal government and not smoothed at all. According to their measurement, only a relatively small part of shocks (13 percent) has been smoothed by the federal government, while a significant part (39 percent) has been smoothed by capital markets and another relevant part (23 percent) by credit markets. This result has generally been used as an argument to dismiss demands for introducing a fiscal union for the euro-area under which the EU would either get a significant larger budget to help stabilizing the business cycle in euro-area countries or to introduce automatic stabilizers such as a European unemployment insurance for the euro-area. In addition, the results have been used to push for banking union and capital market union in the European Union. The conclusions of Feld/Osterloh (2013, p. 18) are exemplary for this position:

> *"The empirical literature […] has demonstrated that it is not fiscal integration, but financial integration which provides the largest contribution to risk sharing in existing monetary unions, such as the US. This is caused by the cross-holding of credits and assets of individuals and firms which also induces investors from other countries to participate in country-specific shocks, both positive and negative ones. Through this capital market channel, individuals can smooth their consumption, which partially decouples the countries' aggregate consumption from its production and thus mitigates the consequences of idiosyncratic shocks. Even though financial integration through banks can also have destabilizing effects in "quiet" times […], there is some evidence that banking integration is an important element to contain the consequences of a local banking crisis."*

This paper will now argue that this conclusion is a result of a misunderstanding of what Asdrubali et al. (1996) are actually measuring. It shows that the small share of stabilization by the federal governments is a result of systematically stripping out some of the stabilizing effects of the federal government's spending and the federal system of taxes, transfers and grants and by systematically overstating the cross-border risk-sharing properties by including in the measure for stabilization through financial markets effects which at closer inspection have nothing to do with integrated capital or credit markets.

The paper is structured as follows: Section 2 will present Asdrubali et al.'s (1996) original methodology. Section 3 will point out a number of problems with this approach. Section 4 concludes.

2 The standard approach of measuring stabilization by markets and the federal government

Asdrubali et al. (1996) start by defining the possible channels of risk sharing between member states in a federal system. According to them, “members of the federation can share risk via cross-ownership of productive assets, facilitated by a developed capital markets”, they “can smooth their consumption by adjusting their asset portfolio through lending and and borrowing on national credit markets” or can see their incomes smoothed by the “tax-transfer system of the federation’s central government”.

Practically, they define „smoothing“ as the part of fluctuations which is not transmitted from a change in a single state’s gross state product to consumption in that state. The total non-transmission of a shock from gross state product to consumption is decomposed into shocks “smoothed by capital markets”, “smoothed by the federal government”,”smoothed by credit markets” and “not smoothed”. For their analysis, they analyse the correlations of changes of gross state product (the equivalent of gross domestic product at the state level), state income (the sum of personal income in that state, federal nonpersonal taxes and contribution, state and local nonpersonal taxes, interest on state and local funds minus direct transfers), state disposable income (state income plus federal grants to the state government, plus federal transfers minus federal taxes and contributions), and state consumption (proxied by state retail sales). State income can be interpreted as funds available in that state before federal redistribution and state disposable income as a measure for funds available after federal redistribution.

If gross state product in state *i* (gsp_i) changes, but state income (si_i) does not change to the same extend, they interpret this as smoothing by capital markets. If state income changes, but disposable state income (dsi_i) does not change to the same extent, this is interpreted as smoothing by the federal system. Finally, if disposable state income changes, but consumption does not change proportionally, it is interpreted as smoothing by credit markets.

Starting from the identity

(1) $$gsp^i = \frac{gsp^i}{si^i}\frac{si^i}{dsi^i}\frac{dsi^i}{c^i}c^i \ ,$$

Asdrubali et al. obtain the following decomposition (p. 1084):

(2)
$$\begin{aligned}\operatorname{var}\{\Delta\log gsp\} &= \operatorname{cov}\{\Delta\log gsp, \Delta\log gsp - \Delta\log si\}\\ &+\operatorname{cov}\{\Delta\log gsp, \Delta\log si - \Delta\log dsi\}\\ &+\operatorname{cov}\{\Delta\log gsp, \Delta\log dsi - \Delta\log c\}\\ &+\operatorname{cov}\{\Delta\log gsp, \Delta\log c\}\end{aligned}$$

They divide this by the variance of $\Delta\log gsp$ and get

(3)
$$1 = \beta_K + \beta_F + \beta_C + \beta_U \ .$$

β_K is then interpreted as the part of a shock bolstered by capital markets, β_F as the part of shock bolstered by federal transfered, β_C as the part of a shock bolstered by capital markets and β_U as the part of a shock not stabilized at all.

Practically, to get the βs, Asdrubali et al. use panel regressions with fixed time effects ($v_{K,t}$, $v_{F,t}$, $v_{C,t}$ and $v_{U,t}$) to estimate the following equations:

(4)
$$\Delta\log gsp_t^i - \Delta\log si_t^i = v_{K,t} + \beta_K \Delta\log gsp_t^i + u_{K,t}^i$$

(5)
$$\Delta\log si_t^i - \Delta\log dsi_t^i = v_{F,t} + \beta_F \Delta\log gsp_t^i + u_{F,t}^i$$

(6)
$$\Delta\log dsi_t^i - \Delta\log c_t^i = v_{C,t} + \beta_C \Delta\log gsp_t^i + u_{C,t}^i$$

(7)
$$\Delta\log c_t^i = v_{U,t} + \beta_U \Delta\log gsp_t^i + u_{U,t}^i$$

In the end, they get the following estimates of "income and consumption smoothing":

- Capital markets (β_K) 39 percent
- Federal Government (β_F) 13 percent
- Credit markets (β_C) 23 percent
- Not smoothed (β_U) 25 percent

3 Problems with the standard approach

While this methodology looks rather straightforward, it comes with a number of problems which all lead to an overestimation of the role of markets in the shock absorption process and an underestimation of the role of the federal system in shock absorption.

3.1 Ignoring income stabilization effects of direct federal spending

The first problem is that the methodology ignores income stabilization in single states which is brought about by direct spending by the federal government in the states (e.g. for federally financed infrastructure or defence). If federal spending in a state's territory is increased in the wake of a negative shock to a state's gross domestic product, and this spending limits the fall in gross state product, this kind of income smoothing is not measured by this methodology. GSP in this case would just fall by less than it would have otherwise and Asdrubali et al.`s methodology would just detect a smaller Δgsp_i , with no increase in β_F

This problem is highly relevant as in the U.S., regularly part of the stabilization in recession is done by increased spending of the federal government beyond the increase of grants and transfers (Blinder/Zandi 2015) and this increase in spending has generally been credited with stabilizing incomes during the recession.

To be fair to Asdrubali et al. (1996), they do not claim that they provide a complete picture of the contribution of the federal government to income stabilization in single states. However, as their contribution has been widely used to evaluate the merits of centralized budgetary instruments in shock absorption in a monetary union, the failure to measure this effect remains important for the policy debates.

3.2 Ignoring discretionary policy measures in deep crises

The second problem is that the methodology used by Asdrubali et al. (1996) systematically straps out the stabilizing effects of the federal government's reaction to symmetric shocks to state's GSP, for example in nation-wide recessions. For example, in the Great Recession starting in 2008, the federal government systematically made grants to all states in order to prevent the states from cutting back expenditure (Blinder/Zandi 2010). Similar policies have been enacted in prior recessions (Blinder/Zandi 2010). These policies would not turn up in a higher β_F. Asdrubali et al. estimate the βs using panel regressions with time fixed effects. If in a single year, the link between the states' income and the states' disposable incomes in a large number of states becomes weaker (as, for example, incomes fall, but this is compensated by grants to all states), this effect is captured in the time fixed effect $v_{F,t}$ for that year, but will not influence β_F.

One could argue that the effects of the federal system of taxes, grants and transfers on the stabilization of symmetric shocks to states' incomes fall beyond the scope of "interstate risk sharing" and hence can be easily ignored. However, as for the case of stabilization of gross state products through direct spending by the federal government, if the (policy) question is whether a central fiscal authority should be given more resources for stabilization policies, and in the case of imperfect

stabilization through monetary policy (e.g. because of the zero-bound problem or issues in the banking sector), this effect of the federal level's policies is highly relevant.

3.3 Overstating the effect of cross-border stabilization by capital markets

The next problem is that not all of the differences in variations of gross state product and state income really comes from cross-border income smoothing by capital markets, yet all the differences are captured in β_K. Gross state product differs from state income by more than just cross-state flows of investment incomes. Gross state product includes all wages and profits in a state's territory, while state income includes wages and only *distributed* profits to residents (both from in-state and out-of-state firms). Hence the difference between gross state product and state income (which Asdrubali et al. use to measure the degree of income smoothing through capital markets) is the sum of retained profits, profits distributed by in-state firms to out-of-state residents minus profits distributed by out-of-state firms to in-state residents. Hence, if firms try to smooth distributed profits over the cycle (such dividend smoothing by publicly traded companies is a widely known phenomenon, see e.g. Lintner 1958 or Leary/Michaely 2011), this is measured by Asdrubali et al. as part of income smoothing by capital markets. Asdrubali et al. (1996) seem aware of the problem, even though they do not dwell on it further and do not question their results because of this problem. They write (p. 1087):

> *"Only distributed profits are recorded as part of income. Therefore, smoothing via retained profits occurs if corporations retain a smaller fraction of the production value in states that are subject to negative production shocks. Although our estimates are […] sensitive to this, we cannot isolate smoothing via retained earnings from other channels of smoothing."*

Empirically, this phenomenon seems to be quite relevant also on a macroeconomic scale. Figure 1 shows total U.S. corporate profits and undistributed U.S. corporate profits for the time from 1980 to 2015. What can be easily seen is that undistributed corporate profits are much more volatile. In recessions, firms seem to be trying to have undistributed profits bearing the brunt of the volatility in profits, implying that distributed profits remain relatively stable. For example, in the Great Recession of 2008/9, undistributed profits dropped by about 60 percent while total profits only dropped by about 22 percent.

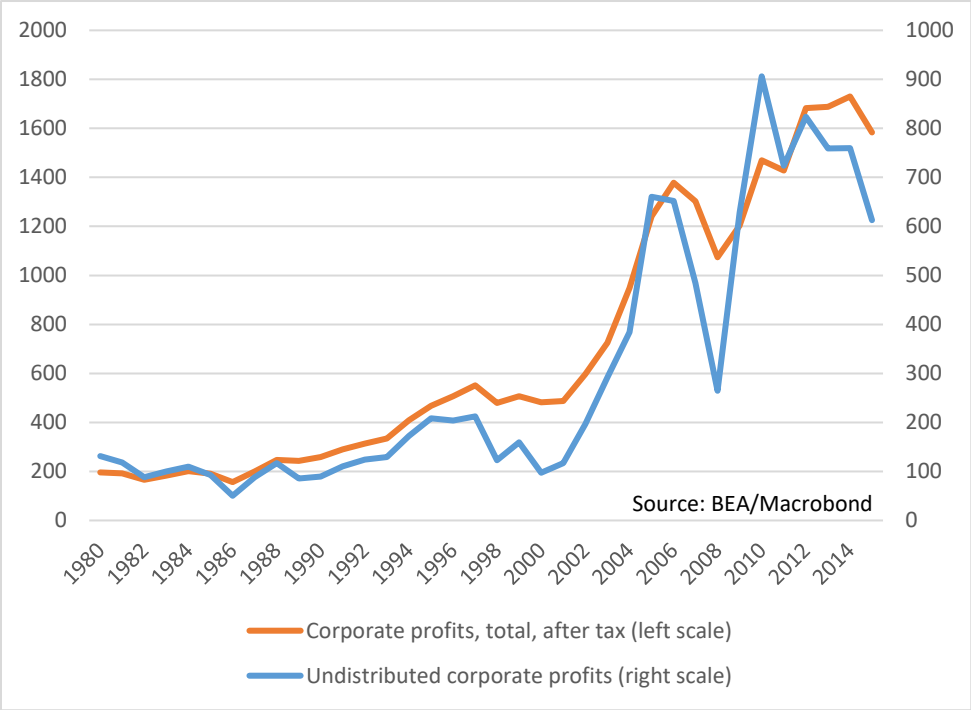

Figure 1: U.S. total corporate profits and U.S. undistributed corporate profits, in billion USD, 1980-2015

While one can might still argue that income smoothing of households as a result of firms' dividend smoothing is somehow related to the capital market, this has nothing to do with "cross-ownership of productive assets" between states, as Asdrubali et al. (1996, p. 1081) define smoothing through capital markets, and can occur also in a completely closed economy. If β_K is interpreted as a measure of risk sharing through capital markets between different territories (as many authors do in the debate on euro-area reforms), this problem leads to a clearly overstated role of capital markets in bolstering shocks.

3.4 Overstating the effect of cross-border stabilization by credit markets

The final problem with the Asdrubali et al. methodology is the interpretation of a less-than-perfect correlation between disposable state income and state consumption as "smoothing through credit markets" or "lending and borrowing on national credit markets" (p. 1081). The phenomenon of households adjusting their consumption expenditure less than proportionally in reaction to a (transitory) shock to disposable income is present in a large number of models for closed economy and is not necessarily result of cross-border risk sharing. For example, a simple Keynesian model with autonomous consumption would yield this result just as a model based on a representative household following the permanent income hypothesis. Yet, following the Asdrubali et al. methodology, any change in a household's saving out of disposable income in reaction to a shock to disposable income would be capture by β_C and hence interpreted as "income smoothing through credit markets".

This issue can be easily demonstrated in a very simple textbook model of a closed economy without governments or cross-border asset holdings. In this model, state income (*Y*) is the sum of consumption (*C*) and investment (*I*) expenditure. Consumption is the sum of an autonomous consumption C_0 and a share *c* of disposable income. This consumption function can either be interpreted as a Keynesian consumption function, or, alternatively, as an approximation of a consumption function of a representative agent maximising utility over his lifetime, with C_0 denoting the part of consumption out of expected lifetime income and *cY* the reaction of a (single-year) fall in income.

It is assumed that all profits and wages are distributed to households. As there are no governments and no links to other states, gross state product equals state income and disposable state income. The model can be summarized by the following equations:

(8) $$Y = C + I$$

(9) $$C = C_0 + cY$$

Which can be summarized in

(10) $$Y = C_0 + cY + I$$

And yields after simple manipulations:

(11) $$Y = \frac{1}{1-c}\left(C_0 + I\right)$$

If we now use (6), the fact that GSP, state income and disposable state income are the same ($dsi_t^i = gsp_t^i = Y$) and the approximation $\Delta \log x \approx \frac{dx}{x}$, we can apply the Asdrubali et al. methodology to this small model and get:

(12) $$\frac{dY}{Y} - \frac{dC}{C} = v_{C,t} + \beta_C \frac{dY}{Y} + u_{C,t}^i$$

from which we get for a single year:

(13) $$\beta_C = 1 - \frac{dC}{Y}\frac{Y}{dY}$$

For the case of unchanged autonomous consumption ($dC_0 = 0$), but a change in investment ($dI \neq 0$), we get:

(14) $$\beta_C = 1 - \frac{c\left(C_0 + I\right)}{\left(C_0 + cI\right)}$$

If we use a very simple arbitrary numerical example similar to those used in textbooks when presenting similar models (C_0=75, I=50, c=0.5), we see that β_C reaches 37.5 percent. Hence, even in the absence of any interaction with other states, the Asdrubali et al. methodology would detect a significant "income and consumption smoothing by credit markets" here.

This demonstration is not saying that a single state's economy works as this simple model. It is merely supposed to show that even in the absence of cross-border credit markets and already in a very simple model, the Asdrubali et al. methodology leads to the conclusion of a significant income and consumption smoothing through credit markets, indicating that β_C is prone to pick up effects which are purely domestic and have nothing to do with cross-border risk-sharing and cross-border income smoothing.

4 Conclusions

This paper has shown that the methodology used in the seminal Asdrubali et al. (1996) contribution carries the danger of misestimating the relative contributions of cross-state income and consumption smoothing of governments and markets in federal systems. Especially, it tends to underestimate the federal government's contribution in stabilizing income shocks and it tends to overestimate the role of cross-border capital and credit markets in bolstering shocks.

This is a highly important result as the contribution by Asdrubali et al. has been used for a large number of academic and policy contributions to push the notion that for a monetary union, the integration of financial markets is more important than the introduction of a large budget at the central level and a relevant volume of horizontal and vertical transfer flows between different government entities. Given the problems with the Asdrubali et al. methodology, these contributions need to be rethought.

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