Kiss Me Deadly:

From Finnish Great Depression to Great Recession

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Abstract

We investigate the causes of the Finnish Great Depression of the early 1990s. We find that the collapse of the overheated financial and banking sectors starting in 1989 was the trigger of the economic crisis. Foreign shocks, which include the collapse of trade with USSR in 1991, can account for at most about half of the slump, and these shocks occurred only when the economy was already in free fall. Also, the deleveraging and restructuring process of the financial system substantially prolonged the recovery.

Our methodology allows us to distinguish between financial shocks affecting the demand for intermediated loans and those shifting the loan supply curve. Hence we also contribute to the discussion on which financial shocks actually matter.

Keywords: business cycles; great depressions; financial shocks; sign restrictions; Finland

JEL Classification: E32; E44; O52

In the early 1990s Finland witnessed a protracted economic contraction, one of the most severe experienced by an industrialized economy since World War II. This "Finnish Great Depression" started at the beginning of 1990, after several years of rapid economic expansion. The cumulative decline in real GDP from its peak in 4Q 1989 to the trough in 1Q 1993 was 12.6 percent in absolute terms, and the pre-crisis level of income was achieved again only in 4Q 1996. Recession lasted for four years. It was preceded by major credit and asset price booms, which came to an abrupt end in late 1989. The episode also witnessed a collapse of Finnish–Soviet trade in 1991, a currency devaluation and a full-fledged banking crisis. Within that time frame the stock market fell by 67 percent while the unemployment rate leaped from 2.9 percent to 17.5 percent.

Generally, the literature provides two main competing explanations of the depression. The first focuses on the collapse of trade with the disintegrating Soviet Union in the first months of 1991. Before the crisis USSR was, alongside Sweden, a major trading partner of Finland. According to Gorodnichenko, Mendoza and Tesar (2012) this shock translated into higher production input costs for Finland and was further amplified by sectoral and labor market rigidities.[1] The second emphasizes the role of financial liberalization of the 1980s, which led to a sharp credit expansion and exploding house and stock prices (Vihriälä, 1997). The asset bubble burst was followed by major financial and banking crises, similar to those observed in many countries after 2007. As a result, the economy was left with a large pile of debt (Kiander and Vartia, 1996), which prolonged the recovery.[2]

In this paper we put these two main explanations on an equal footing and assess their relative importance. We estimate a structural VAR of a small open economy, in which we identify a range of shocks using the sign restrictions methodology and exogeneity assumptions. The three foreign shocks include export demand, Finnish terms of trade and global financial stress shocks. We also identify two financial shocks, one affecting the demand for intermediated loans (asset price shock) and one shifting the loan supply curve (loan supply shock). Finally, two other domestic shocks affect the real demand and real supply. This allows us to obtain the historical shock decomposition of Finnish GDP and to construct counterfactual scenarios. Also, compared to all previous studies, we have the advantage of hindsight, which allows us to compare the Finnish Great Depression with

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[1] A similar argument is made by Tarkka (1994). Conesa, Kehoe and Ruhl (2007) point to increases in taxes on labor and consumption combined with higher government spending.

[2] See also Honkapohja and Koskela (1999). Many interesting narrative essays on the episode, some of them stressing financial factors, have also been collected in Jonung, Kiander and Vartia (2009).

the late 2000s in Finland, which was another occasion on which the country was hit by strong adverse shocks.

We find that developments in the domestic financial sector played a large independent role in several phases of the 1990s crisis. First, a major asset price and lending boom fueling domestic demand was a key driver of GDP in the run-up to the crisis. Then, the crisis ensued as a result of a collapse of the banking sector and a bust in asset prices. Finally, the restructuring of the financial sector proved to be a heavy drag in the recovery phase. Foreign shocks, including the collapse of Finnish–Soviet trade, played a considerable role in aggravating the crisis. Our counterfactual simulations show that these shocks were also endogenously amplified by the financial sector. However, they can account for no more than half of the drop in GDP dynamics. Moreover, these shocks occurred only in 1991, when the economic crisis was already in full swing.[3] Without transmission by the ravaged domestic financial system and the shocks originating within it, the collapse of Finnish–Soviet trade would have had a considerably smaller impact on Finnish GDP. It was the eponymous "deadly kiss" of the financial sector that turned the Finnish economy into a true film noir in the early 1990s.

The Great Recession in Finland was very different from the early 1990s crisis. The drop in GDP is attributed solely to external shocks, i.e. an increase in global financial stress and a slump in global demand. In fact, the negative export demand shocks around 2008 were much stronger (although more short lived) than those that explain the collapse of Finnish–Soviet trade. However, on that occasion the domestic financial system was initially much more robust and no financial crisis unfolded. As a result, the economic recovery was much faster and the overall reduction in output smaller. A comparison of these two episodes lends strong support to the hypothesis that financial crises of domestic origin, possibly including a banking crisis and preceded by inflated asset prices and high levels of private debt, have a protracted effect on the real economy and are followed by slow, creditless recoveries.[4]

More generally, the Finnish experience of two major economic crises and one recession (in 2001) within just two decades constitutes an excellent laboratory for the study of financial market imperfections and the role of financial shocks in driving business cycle fluctuations.[5] In constructing

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[3]The fact that the end of Soviet trade was largely unexpected, as stressed by e.g. Gorodnichenko, Mendoza and Tesar (2012), means that it was not priced into asset prices nor did it trigger the credit contraction.

[4]See Jordà, Schularick and Taylor (2013). These authors do not include Finland in their sample of countries.

[5]See e.g. Jermann and Quadrini (2012) and Gilchrist, Yankov and Zakrajšek (2009).

our shock identification scheme we are guided by the theoretical literature which stresses disruptions between lenders, intermediaries and borrowers (Bernanke and Gertler, 1989, Holmström and Tirole, 1997). This, combined with a proper selection of variables, allows us to distinguish between two types of financial shocks. The loan supply shock affects the loan supply curve. It may reflect exogenous changes in lending standards, regulatory environment, and costs of monitoring, as in De Fiore, Teles and Tristani (2011).[6] An asset price shock in turn includes bubbles, exogenous changes in borrowers' wealth, as well as risk shocks à la Christiano, Motto and Rostagno (2014). Thus we are able to shed some light on the relative roles and interaction between borrowers and lenders and to say more about which financial frictions actually matter.[7]

This paper is divided into this introduction and four sections. In Section 1 we provide an empirical sketch of the Finnish economy in the 1980s and 1990s. In Section 2 we introduce the model and discuss the identification of structural shocks. We then briefly present the sign restriction methodology and model selection issues. The estimation results are presented in Section 3. We first take a close look at the Finnish Great Depression. Then we take a broader look at the Finnish business cycle and conduct some counterfactual simulations to assess the importance of financial factors for business cycle dynamics. Concluding remarks are given in Section 4.

1 Finland before and during the depression

In this section we provide some background information on the Finnish economy before and during the depression of the 1990s. First, we describe the evolution of the financial system and the dynamics of the crisis. We show that the financial turmoil gave rise to the first phase of the depression, as it began over a year before the collapse of the Soviet trade (which is indicated in all figures by a black vertical line). Secondly, we zoom in on Finnish exports and discuss the role of the Soviet trade. We argue that the reversal in Finnish exports and terms of trade around 1991 was not an exceptional event (as opposed to the financial crisis).

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[6]Bassett et al. (2014) and Helbling et al. (2011) analyze similar shocks to the supply of credit.

[7]Using bank survey data, Ciccarelli, Maddaloni and Peydró (2010) also distinguish between shocks to credit demand and supply, although their definitions are not guided by any particular theoretical framework and the shock specifications do not coincide with ours.

1.1 Financial liberalization and its aftermath

Back in the 1970s the Finnish financial and banking systems were still tightly regulated.[8] The capital market was relatively small and the money market virtually non-existent. Banks were at the center of credit creation in the economy. Loan expansion was tied to the inflow of deposits. Banks were not allowed to borrow from abroad. Both deposit and lending rates were very low in real terms, due to tight regulations and also because bank borrowing was subject to tax deductions. The overall result was a shortage of credit and credit rationing. A lack of price competition led to a costly and inefficient banking sector structure with relatively low profitability. The flip side of the highly regulated banking sector was its very high effective leverage. Capital adequacy requirements were two percent of equity for savings and cooperative banks and four percent for commercial banks. Yet the banks had chronic problems in adhering even to these very lenient ratios.

Starting in the mid-1980s the existing system was gradually revamped. The key changes came into effect between 1985 and 1987. The link between deposits and lending was broken, and rules on lending rates were abolished. A genuinely liquid money market was created, and foreign banks gained access to the market as well. Firms and households were both allowed to borrow abroad, but domestic banks remained the main supplier of credit in the economy. At the same time, however, the banking system still relied on outdated risk management practices. The savings and cooperative banks were organized into groups, each around a common commercial bank. The system provided *de facto* guarantees for individual member banks, and idiosyncratic risk was shared by bank-group-specific mutual insurance funds. However, this arrangement was not designed for dealing with systemic risk.

Soon, the financial reform resulted in an explosion of credit. Figure 1 shows the credit expansion dynamics, measured by the value of new loans (in millions of $\text{\texteuro}_{2000}$). New credit began to expand steadily already in the years 1985-1986. Then it shot up, and remained at elevated levels between 1987 and 1989.

Easy access to bank lending was quickly reflected in house and stock prices, as banks started to actively invest in the non-financial corporate sector and to expand mortgage lending. This triggered an asset price boom, which via rising collateral values allowed for further credit expansion. This is shown in Figure 2. House prices exploded between 1987 and 1988. Stock prices in turn rose sharply

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[8]Detailed accounts of the liberalization and economic events in the 1980s and 1990s can be found in Gulan, Haavio and Kilponen (2014), Vihriälä (1997), Kuusterä and Tarkka (2012), and Jonung, Kiander and Vartia (2009).

Figure 1: New bank loans issued, 1981-2000.

Notes: New bank loans to the private sector, deflated by the GDP deflator, millions of €$_{2000}$. Sources: Bank of Finland.
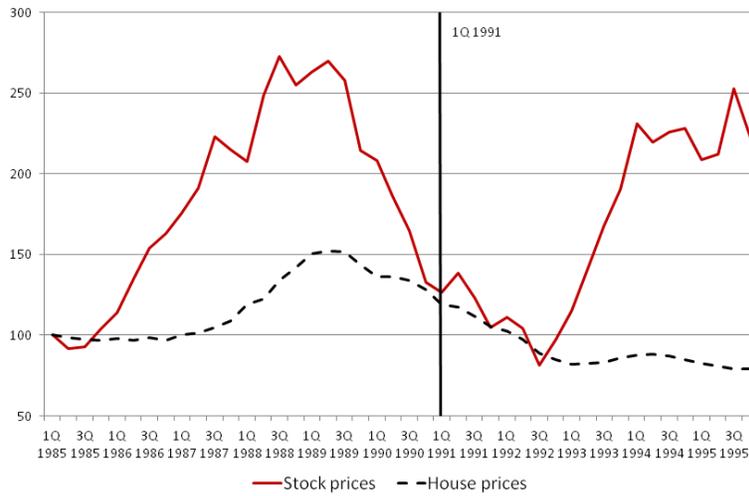
already after the start of 1986.

Figure 2: Stock and house prices, 1985-1995.

Notes: All series are real indices, 1Q 1985 = 100. The metric for stock prices is the capped OMXH stock market index and for house prices an index of old dwellings in the whole country. Sources: Bank of Finland.

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By late 1988 the credit boom became apparent and raised the concerns of policy makers. A tax reform, due to take effect in 1Q 1989, included broader-based and higher taxes on capital gains, in anticipation of which the credit and price dynamics peaked in 4Q 1988. Other indirect taxes were also raised early the next year. Monetary policy in turn was caught in the impossible trinity. The asset boom was fueling demand and inflation. However, the central bank also had to maintain a fixed rate on the Markka. With a liberalized financial account and already strong capital inflows, bold interest rate hikes were precluded. In any case, higher domestic rates would not have affected the cost of borrowing in foreign currencies, which was the more attractive, the wider the rate differential. Nor did the central bank have the prerogative of imposing reserve requirements; instead it had to rely on discrete agreements with banks.

Over the course of 1989 the economic climate changed entirely. The stock market peaked in 2Q 1989 and by the end of 1990 had lost almost 50 percent of its peak value. This reflected a streak of bad news from the corporate sector, including poor economic performance, bankruptcies and CEO suicides among some of the largest firms. The dynamics of new credit subsided substantially as well, and by the end of 1989 the boom virtually dried up. The impact quickly passed through to the real economy. In 1Q 1990 investment began its multi-year decline, depicted in Figure 3, which closely matches the pattern for loans from Figure 1.

The reversal of economic conditions and falling stock prices affected firstly the most highly leveraged financial institutions. The most spectacular failure was that of SKOP, the umbrella institution of the savings banks group, which was ultimately taken over by the Bank of Finland. Starting in 1992, the government had to resort to capital injections and established a special institution with the task of stabilizing the banking sector. Dozens of savings banks were merged. Assets of failed banks were recycled via a special purpose vehicle. In 1993 government guarantees were extended beyond deposits to all bank liabilities. The banking crisis triggered a major restructuring of the industry. The largest commercial bank, KOP, after being rescued as well, was merged with its main competitor SYP in 1995. The whole sector shrank, the number of branches was cut by a half and the number of employees contracted from 55,000 in the boom years to 30,000. The Bank Inspectorate was also shut down and replaced by the new, government-independent Financial Supervision Authority in October 1993.

To conclude, financial liberalization in Finland was not accompanied by parallel introduction of modern safety measures in the financial sector. Throughout the 1980s the country failed to
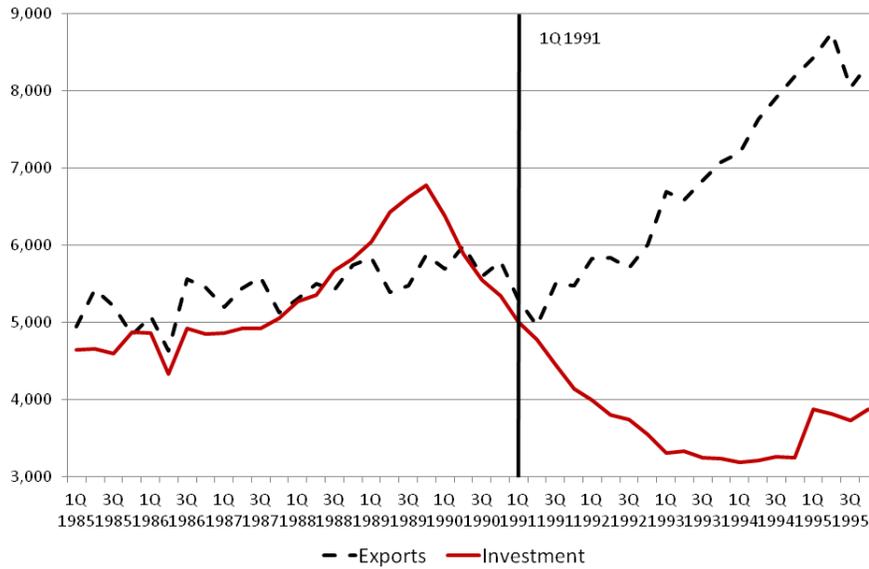
Figure 3: Finnish Investment and Exports, 1985-1995.

Notes: All series are in levels, measured in millions of $\text{\euro}_{2000}$, following ESA 1995. Exports include goods and services. Investement is gross fixed capital formation. Sources: Bank of Finland.

implement regulation which would require banks to keep more equity.[9] In effect, no law was passed until the financial crisis was in full swing. In consequence, the banks entered the credit boom era highly leveraged and vulnerable to negative shocks, which hit them in 1989 and 1990. Finland ultimately implemented the Basel-based higher adequacy ratios in 1991, but the banking system was already in trouble by that time. As the implementation was already overdue by then, the new policy ended up being strongly procyclical, aggravating the credit contraction during the sharp downturn.

It is instructive to compare the situation in Finland in the late 1980s with that in Finland itself in the run-up to the Great Recession. Since the Great Depression the housing and stock markets have largely decoupled. House prices rose without major interruptions or price explosions and fell only slightly in 2001 and in 2008. The stock market on the other hand, experienced a major price

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[9]To be sure, new rules were debated, and in 1986 an interinstitutional working group made some proposals. The proposals were still quite liberal, calling for a four percent capital adequacy ratio based on risk-weighted assets across the whole banking system. However, in 1987 the Basel Committee on Banking Supervision issued its own, much tougher recommendations, which rendered the parliamentary effort largely obsolete.

bubble during the era of dot-coms and preponderance of the Finnish IT sector.

Between 2001 and 2007, real credit to the private sector grew steadily at an average rate of 11.9 percent per year. Interest rate spreads increased only moderately following the dot-com bubble burst, although they widened noticeably following the Lehman Brothers collapse. However, between 3Q 2004 and 2Q 2008 they persistently fell. This reflects the gradually evolving environment of the banking industry and tightening competition. Also, the summer of 2004 brought the news regarding implementation of new Basel II recommendations on bank capital requirements. This created an incentive for banks to expand balance sheets by rebalancing portfolios towards assets classified as safer.[10] In Finland this led to an increase in mortgage lending.

Notwithstanding the fact that credit expansion accelerated in Finland after the year 2000, it started only a few years after the system had been fundamentally transformed in the mid-1990s. The fresh memory of the crisis of the early 1990s kept the degree of risk aversion relatively high as compared to other European countries. The exposure to US asset-backed securities prior to the Lehman Brothers collapse was minimal. The industry remained relatively well capitalized with equity-to-assets ratios of 9-10 percent for the major banks in 2006. Compared to the late 1980s, banks were much less leveraged and adhered to much more restrictive (Basel I and II) safety regulations (see also Jokivuolle, Pesola and Virén, 2014).

1.2   Trade with USSR

The main characteristic that distinguished Finland from other Western European market economies during the Cold War period was its large volume of trade with the USSR.[11] The trade was based on a clearing principle, although the arrangement allowed for short-term imbalances, within bounds. Finnish exports to the Soviet Union were quite diversified and consisted mainly of manufactured goods. Imports, on the other hand, were dominated by crude oil and other energy products, priced at world market prices, which made it effectively a "goods-for-oil" scheme. These features, combined with a low elasticity of demand for energy made the volume of trade largely dependent on fluctuations in global oil prices. The trade peaked following the Second Oil Shock, reaching 25 percent of Finnish exports in 1981. In the mid-1980s, as oil prices subsided, the share began to shrink. On the eve of the Finnish Great Depression (in 1989), the Soviet Union took some

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[10]See Shin (2012) for a formal discussion of this mechanism.

[11]For details of Finnish–Soviet trade, see Sutela (2014)

15 percent of total Finnish exports. In late December 1990 the Soviets gave Finland a notice of termination of the clearing agreement, which resulted in an immediate collapse of bilateral trade. Between 1991 and 1992, the share fell to less than 3 percent.

Figure 4 plots the dynamics of Finnish goods exports to USSR/Russia between 1Q 1985 and 4Q 2000. It allows us to make several points. First, real GDP started to decline earlier, already in 1990, as the financial crisis was already in progress. Secondly, the first-order effect of the Soviet
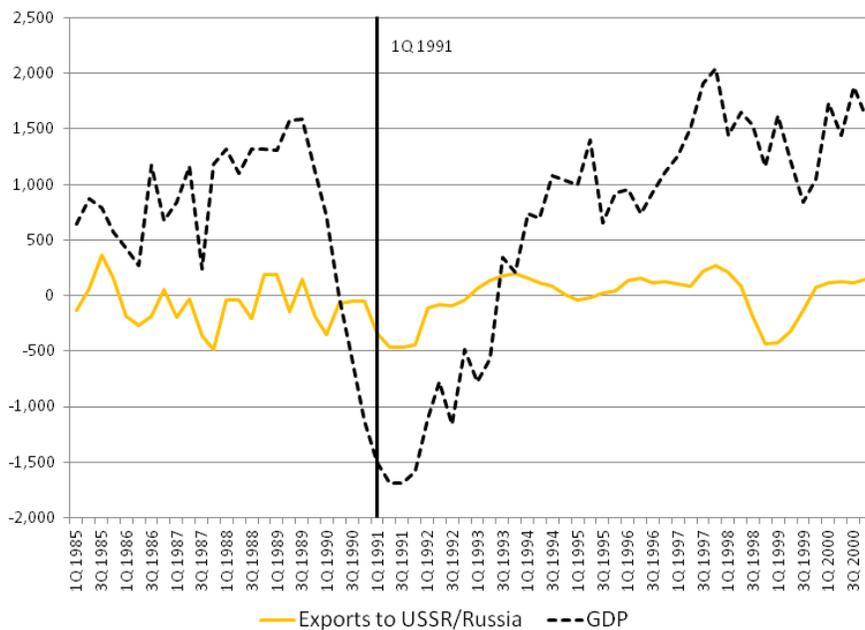

Figure 4: Dynamics of Finnish exports to USSR/Russia and GDP, 1985-2000.

Notes: All series are in millions of €$_{2000}$. Exports to USSR/Russia are exports of goods (not services). The dynamics are measured as year-over-year difference. Sources: Bank of Finland.

trade collapse on GDP was small. Russian exports constituted less than 2.5 percent of Finnish GDP in 1989-1990, much less than the total output loss of 12.6 percent. Finland's GDP contracted from peak to trough by 3,465 mln €$_{2000}$ whereas trade with the USSR plummeted by 457 mln €$_{2000}$, i.e. 13 percent of that figure. Even in the year of the trade collapse (4Q 1990 to 4Q 1991) the drop in GDP was 1,586 mln €$_{2000}$ (-6 percent), whereas Soviet trade shrank by 442 mln €$_{2000}$ (28 percent of that number). Note also that Finland recorded similar declines in sales to its eastern neighbor on two other occasions. Back in 1985-1986, eastward exports declined as world oil prices fell, which

meant that the Soviets had less revenue to pay for their imports and balance the exchange. Another large contraction occurred in 1998-1999, following the Russian default and the financial crisis in August 1998. What is striking though is that the corresponding GDP dynamics around these two events were very different than those of the Finnish Great Depression. In 1991 Finland was already in free fall, whereas in 1986 and 1999 it reported only a moderate slowdown in growth. Finally, what ultimately matters for the GDP is the total exports of goods and services, presented in Figure 3. This decline was not only much smaller than the collapse of investment; it occurred only at the turn of 1991 and reversed in the following quarters. Real exports reached their pre-crisis level already in 1992, despite the loss of the eastern market. This was at least partly due to the devaluation in November 1991 and the abandonment of the peg in September of the next year.
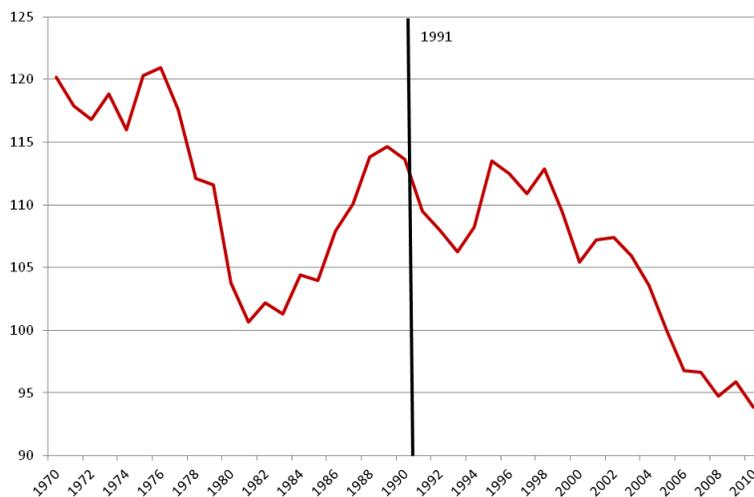

Figure 5: Terms of trade in Finland, 1970-2010.

Notes: Terms of trade is defined as price of exports over price of imports. Index, 2005=100. Source: Bank of Finland.

USSR was a peculiar trading partner for Finland also because this part of exports was sold for a hefty markup relative to world prices. As argued by Gorodnichenko, Mendoza and Tesar (2012), this constituted an implicit energy subsidy for Finland and made Finnish terms of trade exceptionally favorable. The collapse of Soviet trade translated *de facto* into an increase in energy prices of more than 10 percent and could therefore be regarded as a negative terms of trade shock. In Figure 5 we plot the Finnish terms of trade. The country experienced improved terms of trade

starting in 1986 and running until the early 1990s. The relative price of exports dropped abruptly in 1991 with the end of Soviet trade. Nevertheless, the drop was not a shift from some constant previous level, but rather a correction of a four-year boom. This correction was also at least partly due to the rise in global crude oil prices in the second half of 1990, triggered by the Gulf War. More generally, the fluctuations reflect to some extent changes in the price of oil, where Finland was a net importer. One can see this around the Second Oil Crisis, when the drop in terms of trade was at least as strong as a decade later. However, we do not observe any particular change around 1985, as we did in the dynamics of exports. This suggests that terms of trade might have played an autonomous role as a transmitter of the Soviet collapse shock, in line with the narrative of the "From Russia with Love" paper by Gorodnichenko, Mendoza and Tesar (2012).

2 Model Basics and Identification

In Section 1 we gave an account of the main economic events in Finland between the late 1980s and early 1990s. We have seen that the financial crisis started at least a year before and independently of the Soviet trade collapse. Nevertheless, from 1991 on, these two factors overlapped, which leads to the natural question of which one of them was dominant in driving the collapse of domestic output. To answer this question we decompose the dynamics of Finnish GDP into a series of orthogonal, structural economic shocks. To this end, we estimate a partially identified stationary VAR(1) model of a small open economy. In selecting the variables for the model we are motivated by the objective of remaining agnostic and identifying the possibly most potent sources of disturbances, which we discussed in the previous section.

2.1 The model and the shocks

The 9 variables that we choose can be put into three main groups: one foreign and two domestic. The foreign bloc consists of three variables: world trade volume, Finnish terms of trade and a measure of global financial stress, proxied by the CISS indicator. The second bloc is composed of the standard New Keynesian monetary VAR variables: real output, GDP deflator, and an interest rate measure. For the latter, we use the spread between the lending rate and the money market rate, rather than the short-term policy rate itself. The motivation for this is threefold. First, our estimation encompasses several monetary regimes (peg to ECU, float, Eurozone), which may have

generated structural breaks in the interest rate series, whereas the spread does not suffer from this problem. Secondly, as will be discussed in detail below, the behavior of the spread will allow us to distinguish between real aggregate demand and asset price shocks. The financial variables consist of asset prices (a weighted average of stock and house prices), new bank loans to the private sector and total bank loan losses. Details on the series are provided in an online appendix.

The trivariate foreign block is assumed to be fully exogenous to the domestic part. This is done by imposing ex ante zero restrictions on the relevant coefficients of the transition matrix. As discussed in Subsection 1.2, the volume of Soviet trade was closely linked to the price of oil. More generally, Finland has been a small open economy characterized by a diversified exports structure, whereas energy goods have accounted for a considerable share of imports. Therefore it can be plausibly assumed that Finnish terms of trade were largely exogenous from Finland's point of view. We use Cholesky decomposition in this part of the covariance matrix. World trade is ordered first, terms of trade second, and stress is third. It is conventional to order financial variables after real variables, given that the former tend to be fast-moving and that prices may move faster than quantities. Nevertheless, we do not attempt to identify two separate real structural shocks from the world trade and terms of trade series. Ultimately we are interested in the joint effect of real external demand fluctuations on Finnish GDP. As argued by Gorodnichenko, Mendoza and Tesar (2012), the Soviet trade shock worked through two separate channels: an absolute drop in exports and a collapse in terms of trade. The two variables in the VAR are intended to jointly capture the collapse of exports. However, to the extent that Finnish terms of trade do not react on impact to global financial stress, we are able to identify a separate external financial shock (as opposed to the real external shocks).

Our set of 6 domestic variables allows us to identify four domestic shocks: aggregate demand shock, aggregate supply shock, asset price shock and loan supply shock. For that purpose, we use the sign methodology. The method involves imposing a set of restrictions on the signs of impulse response functions. Based on economic theory, one may e.g. postulate that a particular variable should increase on impact (and possibly also in the next S periods) after a given structural shock. This enables us to identify a maximum of N_d shocks in an N_d-variate domestic block. Our model is therefore partially identified in the sense that the number of sign-identified shocks (four) is less than the number of variables in the domestic block (six). The unidentified block is a linear combination of all other possible shocks that we do not try to identify and which are orthogonal to the four

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identified ones. In particular, this includes the monetary policy shock. We discuss this block in detail in the paragraph on *"Other shocks"* below.

Table 1 summarizes the response restrictions of the 6 domestic variables that we impose to identify the shocks. The sign of the response is required to hold on impact and for at least $S = 3$ periods after the shock. Question marks denote cases in which the shock impact on the variable is either not clear or in which economic theory delivers opposing mechanisms that may offset each other.

Table 1: Sign restrictions for positive domestic shocks.

	Real shocks		Financial shocks	
	Aggregate	Aggregate	Asset	Loan
Variable	demand	supply	price	supply
GDP	+	+	+	+
Inflation	+	−	+	?
Asset prices	+	+	+	+
New bank loans	+	?	+	+
Interest rate spread	+	?	−	−
Loan losses	?	−	−	+

Aggregate demand shock: The postulated reaction of the variables in the New Keynesian block is standard, i.e. the price level should rise along with an increase in the GDP growth rate. The increase in the demand for credit in turn widens the interest rate spread.[12] Asset prices should arguably rise as well, reflecting higher profitability of firms and increasing household income. This in turn should strengthen firms' collaterals and household wealth and increase lending, as is also the case in models with a financial accelerator, e.g. Bernanke and Gertler (1989), hence further boosting demand. Finally, we do not impose restrictions on loan losses. Losses may rise if lending

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[12] It is plausible to assume that the reaction of the central bank is not immediate after the demand shock so that the policy rates do not immediately follow the lending rates. The reason why we are able to make this assumption is that Finland was in a form of fixed exchange rate regime for most of the sample period. Until 1992 the Markka was pegged to a basket of currencies and monetary policy focused on exchange rate movements rather than on domestic demand, as is the case in the standard Taylor rule. Similarly, in 1996 Finland entered ERM2 and later the Eurozone in 1999. Arguably, the European Central Bank does not immediately react to idiosyncratic Finnish demand shocks.

volume and average quality deteriorate. However, the wealth effects may actually improve private balance sheets, due to higher stock or house prices, and reduce loan losses in the private sector.

Aggregate supply shock: What distinguishes a supply shock from a demand shock is that here prices go down, rather than up. A positive shock increases asset prices, reflecting tighter competitiveness and, in the case of some degree of price stickiness, profitability. However, the impact on lending volumes is less certain. On the one hand, higher productivity may trigger new investment, partly financed by increased lending. On the other hand, it allows firms to operate at lower costs, increase profits and increase inside equity, which can then finance the expansion of assets.[13] Since the reaction of loan demand is not clear, it is also hard to say in which direction the lending rate, and therefore the spread, would move.[14] However, it is plausible that loan losses will decrease in the short run, given the improved condition of firms.

Asset price shock: The asset price shock is intended to reflect movements in asset prices and in the demand for credit which are not due to changes in current fundamentals. In one interpretation, this may reflect market exuberance or bubbles, as in Bernanke and Gertler (1999). GDP should respond positively as the shock generates positive wealth effects and stimulates both domestic demand and production. Higher demand in turn puts upward pressure on the general price level. The positive shock automatically translates into higher collateral values. As balance sheets of firms and households improve, loan losses and lending rates decline, which reduces interest rate spreads. Narrower spreads should in turn increase the amount of new loans. A positive asset price shock will therefore generate responses largely similar to a demand shock. What allows us to distinguish the two is the impact on spreads. In the former case, the rising collateral values and improved balance sheets have a direct impact and allow borrowers to obtain cheaper loans. In the case of a standard aggregate demand shock, this channel is only indirect and arguably much weaker. In consequence, the spreads expand because of the directly higher demand for loans.

More generally, the asset price shock can be thought of as one directly hitting the entrepreneurial sector in the financial accelerator mechanism à la Bernanke and Gertler (1989). In the spirit of that original paper, it may be an effect of wealth redistribution between lenders and borrowers, as

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[13]Alternatively, firms would have an incentive to issue new outside equity or corporate bonds, as in Holmström and Tirole (1997).

[14]As was argued in Footnote 12 in the context of the aggregate demand shock, it is likely that the monetary policy reaction will not be effective within two quarters after the shock, so that the spread will not be affected though movements in the policy or interbank rate.

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in the debt-deflation mechanism.[15] A positive shock, being inflationary, reduces the real burden of nominal loan contracts for debtors. This in turn further reduces loan losses. This interpretation is useful for our analysis because it captures the argument of Kiander and Vartia (1996) who argued that the Fisherian effect was at the heart of the Finnish Great Depression. Our specification of the asset price shock also encompasses the risk shock proposed by Christiano, Motto and Rostagno (2014), i.e. a change in the distribution of idiosyncratic entrepreneurial productivity.

Finally, it remains an open issue whether the shock may reflect information about future productivity, whether that gives true or false signals. The answer depends on whether such news is inflationary or deflationary, as in Christiano et al. (2010). In their model, an expected future reduction in marginal cost due to news about higher productivity in the future outweighs its current increase; hence prices fall. However, the effect on inflation in the initial periods is not clear and depends on the policy rule specification. A similar shock is analyzed in Gilchrist and Leahy (2002), where it drives prices up. Therefore, to the extent that news is inflationary, it will be reflected in the asset price shocks. If it is deflatory, it will be picked up by the real aggregate supply shock. The hypothesis that booms can be inflationary seems to be in line with the Finnish experience of the late 1980s and with that of many troubled European countries in the first decade of 2000s, although not with the U.S. experience in the run-up to the financial crisis of 2007-2008.

Loan supply shock: A loan supply shock is interpreted as an exogenous shifter of the loan supply curve. It is not supposed to encompass shocks in banks' assets, which ultimately originate in the borrowers' sector. Rather, it captures changes in effective lending standards or regulatory environment. Our understanding of the loan supply shock is therefore similar to that in Bassett et al. (2014), who define a credit supply shock as a change in lending standards which is orthogonal to bank-specific and macroeconomic factors. Whereas they identify the shock using loan officers' surveys, we rely on the theoretical model's predictions regarding loan loss dynamics.[16] In that sense, our methodology provides an alternative way of studying this shock.[17]

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[15]Other papers that analyze direct shocks to borrowers' wealth include e.g. Nolan and Thoenissen (2009) and Fuentes-Albero (2013).

[16]Ciccarelli, Maddaloni and Peydró (2010) and Lown and Morgan (2006) also use surveys to identify shocks in lending standards, but in their specification the shock is not orthogonal to bank-specific factors, making it a more broadly-defined financial shock that may overlap with our asset price shock.

[17]Although Bassett et al. (2014) study macroeconomic consequences of credit supply shocks, they do not report their impact on loan losses. A somewhat similar strategy to ours is adopted by Helbling et al. (2011) who also use sign restrictions to identify a credit market shock. They use default rates rather than loan losses and work without

In a theoretical framework, a loan supply shock can be thought of as one capturing innovations in monitoring costs describing the loan contract in a financial accelerator. Financial liberalization and looser credit can be interpreted as a reduction in monitoring costs. Higher safety requirements and tougher lending standards would in turn be captured by higher monitoring costs. Examples of studies that analyze this shock include De Fiore, Teles and Tristani (2011) and Fuentes-Albero (2013). What makes the shock distinct from other financial shocks is its impact on default rates of borrowers and loan losses of lenders. For example, a decrease in monitoring costs is clearly expansionary. As the availability of bank loans increases, lending rates fall, hence reducing the spread and stimulating credit. Loan expansion stimulates output and consumption and fuels asset prices. However, as opposed to, for example, risk or net worth shocks, at the same time it also increases default rates and loan losses. Therefore, including the latter variable in the VAR allows us to distinguish this shock from an asset price shock.

We do not make assumptions on which sectors of the economy will benefit from lower lending rates. If it is the entrepreneurial sector, real supply and profits should expand. If it is households, then the shock would fuel domestic demand. However, the two channels would generate opposite movements in prices and therefore the impact on inflation remains unclear. Looking through the lens of a New Keynesian model with a financial accelerator, the latter effect is stronger.

Finally, we also impose an additional zero on the impulse responses of loan losses. Empirically, one observes a lag between an increase in loan availability and a surge in actual banks' loan losses. Loan losses are expected to increase only in the first period after the shock, not on impact. In fact, this is also the dynamics in De Fiore, Teles and Tristani (2011).

Other shocks: The unidentified block of the model includes all other possible shocks orthogonal to the ones identified above. One clear candidate is the shock to monetary policy, i.e. an exogenous drop in market rates. Since this shock is associated with higher real demand and higher prices, one could argue that it is likely to be confounded with the aggregate demand shock defined above. If the pass-through from policy to lending rates was weak, one should observe an increase in spreads after an expansionary monetary policy shock. As documented by Kauko (2005), the pass-through from policy rates to lending rates has been quick, based on the data starting in 1993.

Another caveat is related to the reactions of new bank loans after positive aggregate demand

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any restrictions on the dynamics of macroeconomic variables, which makes their definition broader and harder to interpret.

and asset price shocks. In principle one could argue that rising asset prices would increase the incentive to switch from bank financing to bond financing, in the spirit of the Holmström and Tirole (1997) framework.[18] However, the corporate bond market in Finland has been shallow (as compared, for example, with the US), and entrepreneurial activity is predominantly financed by bank credit rather than by outside equity or debt issuance. To the extent that our sign restrictions are too strict in that dimension, some fraction of aggregate demand and asset price shocks will be reflected in the block of unidentified shocks.

2.2 Model selection issues

We now briefly discuss the details of the sign restriction methodology that we apply to identify the domestic shocks. To facilitate the exposition we proceed by focusing only on the domestic block and treat it as a complete VAR for the rest of this subsection. Consider a reduced-form $\text{VAR}(p)$ model of the form

$$y_t = A_1 y_{t-1} + \cdots + A_p y_{t-p} + u_t \tag{1}$$

where y_t is a vector of variables and the reduced-form errors are $u_t \sim N(0, \Sigma)$. Structural shocks are then linked to the errors through a structural identification matrix W, so that $u_t = W \varepsilon_t$ with $\Sigma = WW'$. This W matrix has to generate impulse responses that satisfy sign restrictions specified by the researcher.

In practice, the identification procedure begins with the MLE estimation of the reduced-form model and the standard Cholesky decomposition of the covariance matrix $\Sigma = BB'$. Now, consider an orthonormal matrix Q, called a rotation matrix, such that $QQ' = I$. Hence,

$$\Sigma = BB' = BIB' = BQQ'B' \tag{2}$$

so that $W = BQ$ and $u_t = BQ\varepsilon_t$. Obviously, there exists an infinity of matrices Q, which give rise to different structural models. The practical task of the researcher is then to consider a multitude of rotation matrices Q and to retain only these rotations which give rise to the desired impulse response patterns and discard all others.[19]

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[18] A similar mechanism occurs in Christiano, Motto and Rostagno (2010), where a positive wealth shock reduces the volume of total loans.

[19] In our case, while drawing the rotations, we must impose the additional condition that loan losses do not react on impact following the loan supply shocks. To this end, we modify the drawing algorithm, following Arias, Rubio-Ramírez and Waggoner (2014).

Because the model is only partially identified, the shocks in the unidentified block (generated by the latter columns of Q) must be orthogonal to all of the identified shocks, as stressed by Fry and Pagan (2011). In other words, the impulse responses generated by any of the non-identified shocks must have sign patterns that are distinct from all the identified structural shocks' impulse responses. We discard all rotations that do not pass this additional orthogonality requirement.

The researcher is then left with the task of selecting the ultimate model from the set of all candidates that satisfy the sign restrictions. A commonly used criterion, suggested by Fry and Pagan (2011), is to select the final model which is closest to the pointwise median of impulse response functions. As we are ultimately interested in the historical decomposition of GDP, rather than some specific paths of impulse responses, we modify this model selection criterion. Our method involves choosing a model that is closest to the normalized pointwise medians of historical shock contributions. To be specific, let $\tilde{\theta}^x_{n,j,t}$ be the normalized cumulative effect of shock j on variable n up to period t, obtained through the vector MA representation of model x. For the purpose of model selection, we take into account only the J identified shocks. The unidentified $N - J$ shocks, initial conditions carried over from period $t = 0$ of the decomposition, as well as the constant of the VAR are ignored. The model choice criterion is

$$x^* = \operatorname*{argmin} \sum_{n=1}^{N} \sum_{j=1}^{J} \sum_{t=1+p}^{T} (\tilde{\theta}^x_{n,j,t} - \bar{\theta}_{n,j,t})^2 \qquad (3)$$

where the $\bar{\theta}_{n,j,t}$ denotes the median over all model candidates and T indicates the length of the sample.[20] An advantage of this criterion selection, relative to that based on impulse responses, is that it is not sensitive to the chosen impulse response horizon. Instead, the minimization is naturally based on the whole available data sample.

3   Results

We now move to the central part of the paper. We first zoom in on the Finnish Great Depression and disentangle the driving forces behind it. We show that the domestically-originated financial crisis was the trigger of the depression and accounts for its first phase. The collapse of the Soviet

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[20]The $\theta_{n,j,t}$ contributions are normalized by their respective standard deviations $\sigma_{n,j}$, i.e. $\tilde{\theta}_{n,j,t} = \theta_{n,j,t}/\sigma_{n,j}$, where the $\sigma_{n,j}$ are computed across all models and periods.

trade becomes important only in the latter part of the slump. Finally, the restructuring of the banking sector was a major drag on the economy during the recovery phase.

In Subsection 3.2 we examine the behavior of Finnish GDP more broadly. We compare the Finnish Great Depression to the Great Recession. The latter episode was not associated with a domestic financial crisis and hence was much more short-lived, despite the fact that the foreign shocks were stronger this time than two decades earlier. We also offer some more general remarks about the role of financial shocks and other driving forces of output in Finland.

We generated five billion draws of the Q matrix and found 2,700 matrices that satisfy the sign restrictions and pass the FP filter. The reported median model of choice was selected using the methodology described in Section 2.2. In an online appendix, we also report the results from models estimated on two subsamples. In the first case, we only use the data from 1Q 1986 to 4Q 2004. This robustness check assures that our conclusions regarding the Finnish Great Depression are not driven by the financial crisis of 2007-2008 or the Great Recession. In the second estimation we end the sample at 4Q 1998, to discard the period of membership in the Eurozone. Both checks give a picture similar to that reported in the paper.

3.1 Finnish Great Depression

Before assessing the relative size of the factors that can account for the Finnish Great Depression, we need to know which shocks can account for the financial crisis and which could be associated with the collapse of the Soviet trade. For the purpose of this exercise, we associate the shocks to the domestic financial factor with the asset price and the loan supply shocks. Which shocks then account for the Soviet trade collapse? Here the answer is less clear-cut. Therefore, we use the widest possible interpretation. This allows us to establish an upper bound for its impact and, if anything, it will generate a bias against alternative hypotheses on the causes of the depression. The drop in demand from the USSR can in the first place be attributed to innovations in external trade and terms of trade, although clearly these series are contaminated by shocks stemming from countries other than the Soviet Union, most importantly Sweden and the UK, both of which experienced severe recessions in the early 1990s. Secondly, the collapse of eastern trade can also be thought of as capital obsolescence or depreciation and interpreted by the model as a negative shock to the domestic capital stock. This is because a considerable part of the sectors exporting eastwards became obsolete after 1991. The largest firms (e.g. in the shipbuilding industry) were able to partly

change their production profiles. However, most small and medium-size production plants had to shut down. To summarize, we will proxy the Soviet trade collapse as the sum of the world trade, terms of trade and aggregate supply shocks, while bearing in mind that this is really an upper bound for its true impact.

Finally, one could also argue that the Soviet shock is partly reflected in the global financial stress series. The causality chain would start with a crumbling Soviet block giving a green light to German unification. The surge in government spending in the former GDR increased inflationary pressure in Germany and resulted in interest rate hikes orchestrated by the Bundesbank. This in turn put pressure on the exchange rate pegs throughout Europe (including Finland, Sweden and the UK), culminating in the ERM crisis in September 1992. The link is nevertheless only implicit and the interpretation rather far-fetched. We therefore not include the stress shock in the block of USSR-related shocks.[21]

Figure 6 reports the relative size of financial shocks (yellow bars) and USSR-related shocks (blue bars) during and around the depression. We see that domestic financial shocks play a large
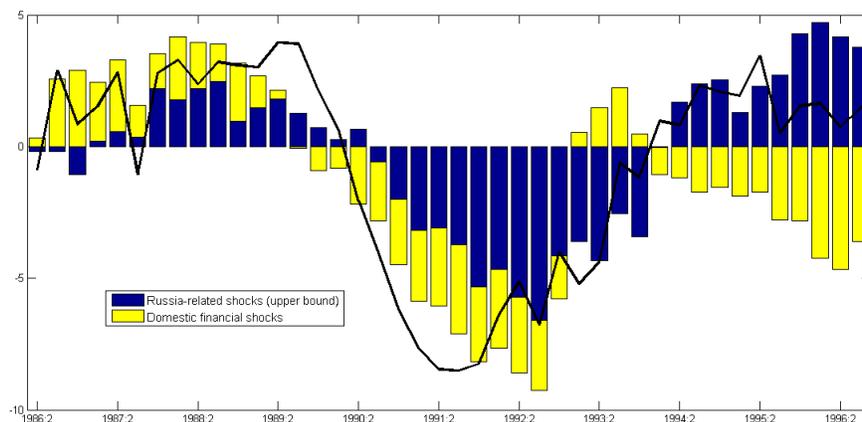

Figure 6: USSR-related vs financial shocks during the Finnish Great Depression.

Notes: GDP growth rate is demeaned, sample mean is 2.04%.

independent role at several stages of the depression. Between 1986 and 1989 we see a sequence of

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[21]In any case, these events unfolded when the Finnish crisis was already in full swing and can therefore potentially explain only a fraction of its depth.

positive contributions of these shocks, which reflects the financial liberalization and the resulting credit and asset price booms. However, these positive contributions recede throughout 1989 and after the start of 1990 they begin to drag the economy down, which they continue to do until late 1992. The relative role of foreign shocks around that time was still moderate. Until 1Q 1991 these foreign shocks were also not related to the Soviet trade collapse. Nevertheless, GDP had already been in free fall since the start of 1990. This illustrates that the first phase of the depression was unrelated to the Soviet trade collapse and, instead, was largely driven by financial factors. The second stage of the crisis is in turn dominated by external shocks, which can be plausibly associated with the collapse of Soviet trade. In fact, they dominate the picture in late 1992 and in 1993. Finally, one can distinguish a third phase of the depression, the recovery phase between 1994 and 1996. Here again the financial shocks are large negative contributors to the GDP dynamics and the major hindrance to the recovery. Foreign shocks, in turn, are on the positive side and strong. Overall, the negative contributions of domestic financial shocks constitute 41.7 percent of all negative shocks between the peak in 4Q 1989 and the trough in 1Q 1993. The share of USSR-related shocks for that period is 52.7 percent. If we analyze the period from 4Q 1989 to 4Q 1996, i.e. up until the quarter in which the economy returned to its pre-crisis peak, the shares are 40.6 percent and 44.6 percent, respectively.

In Figure 7 we examine the extent to which the financial crisis was driven by the collapse of Soviet trade. According to Gorodnichenko, Mendoza and Tesar (2012), the financial and banking crisis was an endogenous result of this real shock originating abroad. To this end, we perform two counterfactual simulations of GDP. In Counterfactual 1, depicted by the solid red line, we only turn on the USSR-related shocks.[22] We then construct Counterfactual 2, depicted by the dashed orange line, in which we additionally close the feedback from domestic financial variables (i.e. asset prices, spread, new loans and loan losses) to the rest of the economy (all variables in the domestic block).[23] Therefore, the difference between the two counterfactuals can be treated as a proxy for the endogenous amplification of USSR-related shocks due to the domestic financial sector. The figure suggests that such amplification was indeed at work. However, it became fully operative only around 1992 and died out by the end of 1993. Therefore, this mechanism was too weak and came too late to explain the full depth of the financial crisis, especially its first stage in 1990 and 1991.

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[22]Technically this is done by imposing zeros on the appropriate entries in the B matrix.

[23]Technically, we impose *ex post* zero restrictions on the appropriate entries in the A matrix.
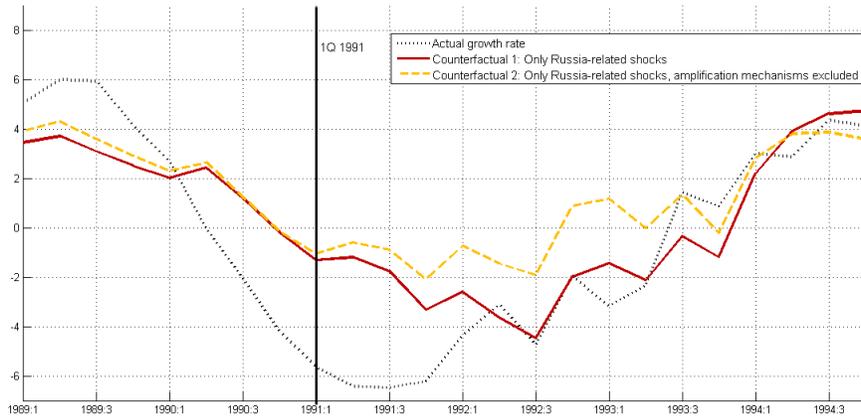
Figure 7: USSR-related shocks and their amplifiers during the Finnish Great Depression.
Notes: GDP growth rate is demeaned, sample mean is 2.04%.

More generally, a comparison of Counterfactual 1 with actual GDP makes it clear that the Soviet shocks cannot account for the whole (or almost whole) depression, especially not for its initial phase.

3.2   Historical Decomposition

In this subsection we provide more details behind the results reported in the previous subsection. We show which specific shocks have been the strongest throughout the Finnish Great Depression and over the Finnish business cycle more generally. We start, however, by comparing the depression of the early 1990s with Finland's economic performance during the Great Recession (and also during the recession of 2001). Figure 8 depicts the historical shock decomposition of Finnish GDP dynamics over the last quarter century. The decomposition reveals that the two economic crises were very different in nature. Firstly, the crisis of the early 1990s was longer and resulted in a larger total loss in GDP. In the late 2000s the contraction was somewhat sharper but much more short-lived. In 2001, the contraction was very mild and the recovery swift. Secondly, the sources of shocks were different. Foreign shocks (both real and stress) were the dominant drivers of the cycle both during the Great Recession and in 2001. Domestic shocks were minuscule. In fact they both appear as imported recessions. This stands in contrast to the Finnish Great Depression, where domestically-originated shocks dominated. At that time, real foreign shocks began to drag the economy down
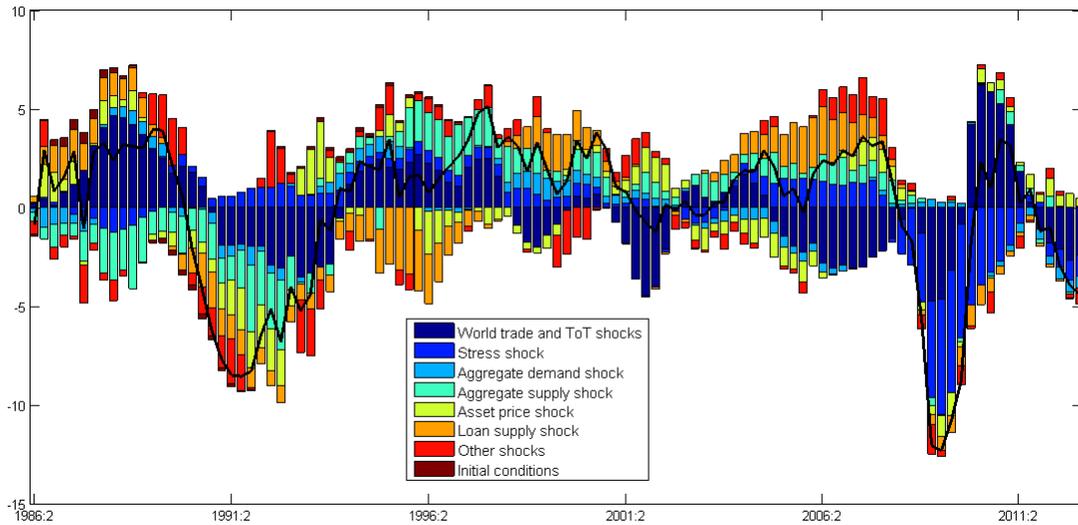
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Figure 8: Historical decomposition of Finnish GDP growth rate.

Notes: GDP growth rate is demeaned, sample mean is 2.04%.

only in 1991, reflecting the collapse of Soviet trade. They were also much weaker than in 2007-2008. Nevertheless, they played a large positive role in the run-up to the crisis of the early 1990s. This largely reflects the terms of trade boom of the late 1980s. As discussed in Subsection 1.2, that was a temporary effect driven by low world oil prices. The boom was extinguished in the following years, partly because global energy prices rose and partly because Finland lost the implicit energy subsidy from the USSR.[24] Interestingly, our decomposition does not link the depression to the financial turbulence in Western Europe, although the ERM crisis is clearly picked up by the CISS series. In fact, financial stress appears to make mildly positive contributions throughout the early 1990s.[25] However, in 2008 its contribution was very large, and it affected the economy even more

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[24]More generally, the significant role played by real external shocks over the business cycle might be attributed to two factors. Firstly, Finland is a small open economy in the sense that its exports constitute a relatively large share of GDP. Secondly, for most of the time in our sample it had some form of a fixed exchange rate regime, first against a trade-weighted basket and ECU until 1992 and, from 1996 on, in the ERM2 and Eurozone. Therefore it could not rely on a flexible exchange rate as a shock absorber.

[25]This might be due to Cholesky being an unsatisfactory identification approach. It is very important to note, however, that, if anything, a failure to properly identify the financial stress shock would lead to overestimation of the contribution of real foreign shocks. This is because of the exogenous nature of the external block of the VAR.

than the contraction of external trade.[26]

The third difference, strictly related to the other ones, was the absence of a domestically-originated financial crisis during the Great Recession and around the dot-com bubble bust. Therefore, in the rest of this subsection we look more deeply at domestic financial shocks.

The run-up to the Great Depression was characterized by a rapid growth. On the domestic side, GDP was boosted by positive shocks to the loan supply. Hence, the decomposition picks up the credit expansion that followed the financial liberalization in the mid-1980s. However, it does not leave much room for asset price shocks. This suggests that the increase in asset prices was largely an endogenous process, ultimately triggered by greater availability of credit. Both types of financial shocks are present in the first, financial phase of the depression. The collapse of the asset price bubble played an important role between 1990 and 1992. Negative loan supply shocks also contributed negatively, especially in 1990. Loan supply shocks also played a dominant role between 1994 and 1996 when they dragged down the economy in the last, recovery phase of the depression. This, again, reflects two empirical effects. The first is the lagging nature of loan losses and the fact that lending was still depressed long after the recession officially ended. In fact, new lending did not pick up until 1998, which makes the episode a good example of a creditless recovery.[27] On the other hand, the banking sector was undergoing considerable restructuring, as described in more detail in Subsection 1.1. An independent financial supervision was established. Banks were required to recapitalize and many were merged. The total sector shrank by half in terms of branches and employees.[28]

Loan supply shocks have played an important role not only during the depression of the early 1990s. Positive shocks can be observed also in the run-up to the recession of 2001 and to the

Regardless of the decomposition of the covariance matrix B, the sum of all structural shocks in the foreign block for a given period will always be the same. Therefore, if our identification of the stress shock wrongly attributes a positive role to Finnish GDP dynamics in the early 1990s, then it also overestimates the negative contributions of the other shocks in the foreign block.

[26]Between 2006 and 2010 Finnish terms of trade were largely constant, as reported in Figure 5. Therefore, it is fairly safe to attribute the real external shocks to world trade fluctuations around that time.

[27]See Claessens, Kose and Terrones (2009) and Calvo, Izquierdo and Talvi (2006).

[28]However, it was not clear ex ante what ultimate form the restructuring of the financial and banking sector would take. The bank mergers and overhaul of financial supervision were discrete decisions chosen from several options, some of which might not have involved equally drastic downsizing of the banking sector. Therefore it is natural to think of them at least partially as shocks, rather than endogenous responses of the financial system. See Kuusterä and Tarkka (2012) for details.

Great Recession. Strikingly however, whereas negative shocks occurred twice during the Finnish Great Depression (in the early stage of the bust and then again in the recovery phase), they did not contribute to either of the last two recessions. As a result, the economy's recovery was rather quick in both of these latter episodes, despite their very different magnitudes. This stands in sharp contrast to the experience of the early 1990s. During the Finnish Great Depression domestic, and in particular financial, shocks substantially contributed to the slump. They also dragged the economy down during the recovery phase. This reflects the simple fact that in the early 1990s Finland experienced the only domestic financial and banking crisis of the last quarter century. As a result, that contraction was much more prolonged and thus resulted in a massive decline in total output.

The large positive role of domestic financial shocks since the late 1990s can also be traced to the behavior of the interest rate spread, new loan volumes and asset prices. According to our identification scheme, a positive domestic financial shock should reduce the spreads. In the case of the asset price shock this would occur due to rising collateral values; for the loan supply shock it would reflect lower monitoring costs. Empirically, as discussed in Subsection 1.1, the interest rate spreads have been gradually narrowing since the recession of 2001, which reflects increasing market competition and changes triggered by Basel II standards. This can be seen in the significant role of the positive loan supply shocks in the run-up to the Great Recession.[29] Why does the historical decomposition not attribute a large role to asset price shocks? Our asset price measure only partially reflects the stock market booms and busts. The first reason is the decoupling of stock and house prices, discussed in Subsection 1.1, and the stable dynamics of house prices since the mid-1990s. The second reason is that the stock market series used in the index is capped. Therefore it can only fractionally be associated with the dynamics of Nokia corporation.[30]

To gain further insight into the role of financial factors during the Finnish Great Depression, and over the business cycle more generally, we construct two additional counterfactual scenarios. In particular, we ask to what extent was the domestic financial system the actual source of shocks

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[29]As shown by Diamond and Rajan (2012) using a theoretical model and confirmed empirically by Maddaloni and Peydró (2011), bank lending standards may weaken due to low policy rates. This gives rise to a "risk-taking channel" in which a monetary policy shock drives down monitoring costs and shifts the loan supply curve outwards. To the extent that this mechanism is operative in Finland, it would also be accounted for by the loan supply shock in our decomposition.

[30]The reason for using a capped series is that Nokia was largely foreign-owned already in 2000 so that the fall in its share prices affected mainly foreign rather than Finnish balance sheets.

and to what extent was it merely an amplifying mechanism for other shocks buffeting the economy. The results are summarized in Figure 9. The dashed red line depicts Counterfactual 3, i.e.
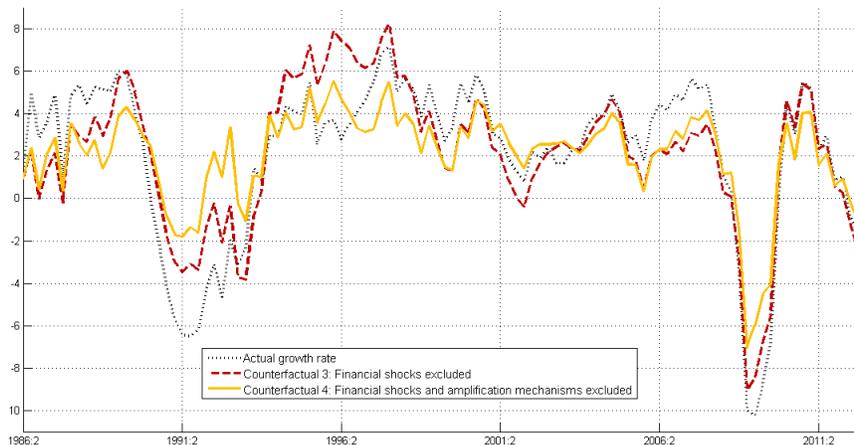

Figure 9: Contributions of different financial factors to the Finnish GDP growth rate.

the hypothetical GDP growth rate, with the domestic financial shocks (the asset price and loan supply shocks) shut off and all other shocks on. As a result, the negative GDP growth rate in the trough of the depression (3Q 1991) is almost halved. In 1992 and 1993 the difference is equally striking. Without these shocks, the economy would have experienced only a rather mild recession. In Counterfactual 4 (solid orange line) we additionally turn off the transmission from domestic financial variables to the rest of the economy. The picture changes yet further. The recession turns into a moderate recovery between 1992 and 1993. We interpret this result as further evidence that financial factors indeed played an important role in deepening the Finnish Great Depression. A large role played by domestic financial factors is also clear during the run-up to the crisis, i.e. in the late 1980s. Positive financial shocks add two to three percentage points to the GDP growth rate in 1987 and 1988. Amplification effects make this impact even more pronounced. In contrast, the relative role of financial shocks in 2008 was much smaller.

4   Conclusions

We conducted an empirical study of the Finnish business cycle, focusing on the Finnish Great Depression of the early 1990s. The episode was triggered by a bust of the lending and asset price

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bubbles followed by a financial and banking crisis with exploding bankruptcy and loan loss rates. In a counterfactual exercise in which the feedback from financial to real variables is shut down, the decline in GDP is about half of what was actually observed in the early 1990s. The crisis of 2008-2009 was, on the other hand, very different. We find no evidence of domestically-generated financial shocks contributing to the contraction at that time. It was in fact an imported recession. A lack of a domestically-originated financial crisis allowed for a much quicker recovery. The very different nature of the two episodes is largely explained by the initial state of the financial sector. In 2008 banks were on average less leveraged than in the late 1980s, and the credit expansion took place within the regulatory framework in place at the time. The holdings of toxic foreign asset-backed securities were minuscule. In contrast, in the late 1980s Finnish banks entered the lending boom with outdated safety regulation, very low equity levels and no proper fire-prevention measures that would allow policy makers to act quickly. In consequence, the decline was prolonged and turned into a depression, with negative GDP growth rate in 13 consecutive quarters and a slow, creditless recovery.

Our methodology sheds some more light on the question of which financial shocks actually matter for business cycle fluctuations. In the context of Finland, earlier studies stressed the role of asset prices (Vihriälä, 1997 and Drees and Pazarbaşıoğlu, 1998). We in turn find a dominating role for shocks shifting the loan supply curve. This should not be very surprising *per se* given the central role played by commercial banks in the Finnish financial system, although our study is the first to reach this conclusion.

Our overall results do not deny a considerable role for the collapse of Soviet trade in the making of the Finnish Great Depression. The breakdown of exports to USSR was clearly a strong exogenous shock that aggravated the situation. Nevertheless foreign shocks, also those not related to Russia, came too late to explain the collapse of the economy and therefore tell only half of the story. The second half is the one about the "casino economy", starting with financial liberalization and triggering a credit-fuelled boom which collapsed over a year before the USSR stopped importing from Finland.

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