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Finance and the Business Cycle

The Ricardian Perspective

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Abstract

A Ricardian-type set-up is used to explore the linkage between financial development and the business cycle. Though financial advancement may be good for growth due to making possible a higher degree of division of labor, it may, for the same reason, be bad for the business cycle. Building on the duality between financial risk diversification and technological risk diversification the paper presents theoretical evidence that financial sophistication while providing ample income insurance may have a macroeconomic downside which shows in larger aggregate output fluctuations. Using a panel data set covering 22 OECD countries over the period 1970 through 2000 we present preliminary empirical evidence corroborating the proposition that financial advancement destabilizes the overall business cycle.

JEL classification: E22, G00, G30, O16, O40

Keywords: business cycle, macroeconomic fluctuations, financial system, stock market, panel analysis

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1. Introduction

Based on a Ricardian-type model *Saint-Paul* (1992) makes a very strong point in favor of financial markets development: Advanced financial markets increase productivity and foster overall growth due to making possible a greater specialization of resources. The author's key argument is as follows: Since financial instruments facilitate the diversification of risks firms, in the presence of advanced financial markets, are more inclined to engage in more risky, and thus more productive technologies with higher degrees of division of labor.

Consequently, in the absence of developed financial markets firms tend to reduce their overall risk exposure by choosing less risky, less productive, and more flexible technologies. In so doing, entrepreneurs can, under the given circumstances, expect to be more effectively shielded from unpredictable (demand-) shocks. As a result, firms with no or only limited access to advanced financial markets retard overall growth due to selecting a lower degree of specialization in order to secure a higher level of insurance.

However, the Ricardian theoretical setting allows an even broader view on the linkage between finance and macroeconomics than *Saint-Paul* (1992) has taken in his seminal paper. It can be shown that his model can also be used to explore in depth the flip side of the classical finance-growth linkage, which is said to be a positive relation between financial markets advancement and aggregate output fluctuations. That is to say, Saint-Paul's model provides strong theoretical evidence that advanced financial markets do cause larger output fluctuations than less developed financial markets. Calling attention to this macroeconomic downside of financial markets development is the aim of this paper.

The remainder of this work is structured as follows: Section 2 revisits the Ricardo – Saint-Paul model as outlined in *Saint-Paul* (1992) and discusses the mechanism by which financial markets advancement causes larger aggregate output fluctuations. Section 3 provides preliminary empirical evidence in favor of this finding. Section 4 concludes.

2. The Ricardo – Saint-Paul Model Revisited

The model is based on the Ricardian theory of labor productivity and comparative advantage. In following *Saint-Paul* (1992) we state that there are two countries, both are populated by a continuum of consumers and entrepreneurs, respectively. In each country there are as many consumers as entrepreneurs. The entrepreneurs are endowed with technical knowledge which enables them to produce two goods. Country 1 is assumed to have a comparative advantage in producing good 1, country 2 in producing good 2. Technological flexibility is captured by an index ψ, with ψ large (small) indicating a low (high) level of specialization. Comparative advantage is captured by imposing a cost f on non-specialized production.

Since country i is assumed to have a comparative advantage in producing good i its firms, when choosing technology ψ, are capable of producing with one unit of capital $(1-\psi)$ units of good i or $f\psi$ units of good j, respectively. By fixing $f<1$ we indicate that flexibility is costly for a firm of country i to engage in producing good j. Of course, there would be no cost of flexibility and hence no comparative advantage if $f=1$.

Further, there are two periods. In the first period, the entrepreneurs choose technology ψ and sell shares to consumers in order to fund production. Consequently, each consumer owns one unit of capital of technology ψ. In the second period, the entrepreneurs are to sell their products to the consumers who pay their buy with the dividend they are supposed to receive from the entrepreneurs. However, demand uncertainty due to a taste shock causes this dividend to be unsecure. The consumers of both countries are assumed to demand with equal probability the same good, that is to say, they prefer with probability ½ either only good i or only good j. Since consumers are identical they share the same utility function. Surely, utility gains by consuming the amount x of whatever good is preferred are equal across consumers.

Since we are interested in exploring the linkage between finance and output fluctuations we concentrate our reasoning on the implications of the model when both countries are endowed either with poorly developed or with highly developed financial markets. We consider financial markets to be advanced when the consumers can buy shares of all firms. Obviously, under such favorable financial circumstances the consumers can, by investing equally in domestic and foreign stocks, fully diversify away their income risk brought about by unsecure dividend payments due to the taste uncertainty the entrepreneurs are assumed to be facing in the second period. If the consumers can only buy shares of domestic firms then the financial markets are said to be retarded and hence there must be some technological diversification acting as a risk management device.

Given this structure, it is easy to see that it is optimal for each entrepreneur to choose the technology ψ which maximizes the shareholder's utility. For simplicity we assume both the continuum of consumers and entrepreneurs in either country to be one, respectively.

In case of poorly developed financial markets, the equilibrium value of ψ is strictly positive and the expected value of aggregate output $E(y)$ (and, in this case, also of aggregate income) is

$$E_{lf}(y)=\frac{1}{2}+\frac{(f-1)\psi}{2}. \tag{1}$$

If financial markets are advanced then full specialization is optimal. That is, the equilibrium value of ψ is zero and the average output is

$$E_{hf}(y)=\frac{1}{2}. \tag{2}$$

Aggregate output, under advanced financial markets, is surely bigger than under retarded financial conditions. In addition, financial advancement also provides consumers with full income insurance supposing they behave optimally. That is, the consumers of both countries when investing equally in domestic and foreign stocks can reckon with a sure income of ½ regardless of the state of nature. Obviously, advanced financial markets do not only elevate average output, but also enhance consumers' utility beyond the level achievable under poor financial conditions.

However, higher output and full income insurance due to financial advancement come with a cost in terms of larger output fluctuations. It is easy to see that the model implies a tradeoff between income risk exposure and output fluctuations. The lower the income risk due to financial sophistication, the larger the output fluctuations.

Simple algebra shows that output fluctuations, as measured by the standard deviation of y, are, in the case of advanced financial markets, as large as the average output, namely,

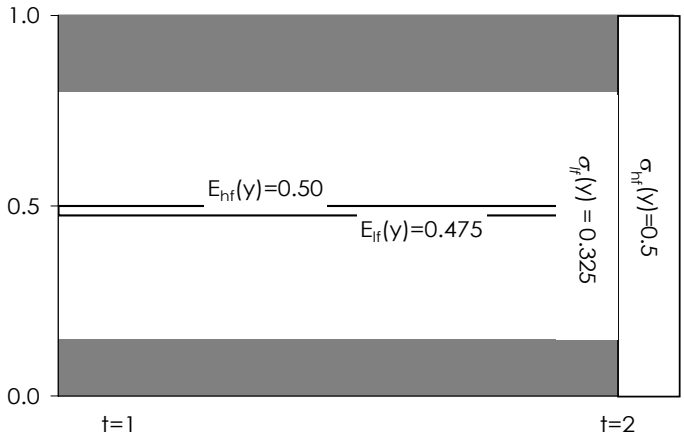
$$\sigma_{hf}(y) = \frac{1}{2}, \tag{3}$$

and, in the case of retarded financial markets, always smaller than the expected output, namely,

$$\sigma_{lf}(y) = \frac{1}{2} - \frac{(f+1)\psi}{2}. \tag{4}$$

Since $E_{lf}(y) \leq E_{hf}(y)$ and both parameters f and ψ are positive, respectively, it follows straight that σ_{lf} is unequivocally smaller than σ_{hf} (for an illustration of this simple corollary, see Figure 1).

Figure 1: Output Fluctuations: Specialization versus Flexibility
$f = 0.75$, $\psi = 0.20$



Thus, the model implies that technological risk diversification triggers much smaller output fluctuations than financial risk diversification.

Further, since σ_{lf} is decreasing with f and ψ, respectively, it is quite obvious that, given a technology $\psi > 0$, output fluctuation reaches its minimum when flexibility is costless, that is, $f = 1$. This case is of particular importance from the viewpoint of social welfare since given the classical structure of the model costless flexibility proves to be the first-best solution.

3. Preliminary Empirical Evidence

Empirical evidence in favor of the finance-growth nexus has been rather inconclusive. Many studies stating that stock markets development do matter as a growth factor suffer from financial development indicators which are highly biased by price effects. As shown in *Hahn* (2002), controlling for price effects all too often leads to the disappearance of the positive linkage between stock market advancement and economic growth.

The same caveat applies to empirical work exploring the various ways through which financial development may affect business cycle fluctuations. Still in its very infancy empirical research in this field of finance has so far yielded, at best, insights of highly preliminary value. Having said that, we proceed by discussing a few empirical findings which have only recently been presented by *Hahn* (2003). To the best of our knowledge, this paper has, so far, provided the strongest indication that there is a positive relationship between stock markets advancement and the magnitude or severity of the macroeconomic cycle as suggested by the model discussed.

Motivating the panel regression results to be presented we conduct a simple test aimed at sensing if we can expect significant larger output fluctuations in countries having already reached a high level of financial advancement than in countries lagging behind financially. A natural candidate for representing the first group are the USA whose financial markets undoubtedly are the most advanced in the world. The second group may best be represented by those European countries which make up the European Union or the Euro area, respectively. Though the USA and Europe share approximately the same high level of production technology, there is evidence that the USA enjoy a higher degree of specialization than Europe (*Aiginger - Landesmann*, 2002). On the other hand, there also is ample testimony that the financial markets of Europe (with the exception of the United Kingdom) fall by far short of those of the USA in terms of magnitude and sophistication.

When using the standard deviation of the aggregate output gap as a measure of output fluctuations, a standard F-test shows that, over the periods given, the US aggregate output gap shows larger fluctuations than that of the European Union and the Euro area, respectively (Table 1). However, as the p-values in Table 1 indicate statistical significance does not meet the standard 1-percent or 5-percent level. Needless to state that this test

doesn't say anything about causality. The difference in aggregate output fluctuations between the USA and Europe may be caused by finance or by any other factor conceivable.

Table 1: Testing the Equality of Output Fluctuations
Null: $\sigma_a = \sigma_b$; alternative: $\sigma_a > \sigma_b$

	Aggregate output gap, annually		
	USA	EU	Euro area
Observations	1964 – 2002	1971 – 2002	1979 – 2002
Standard deviation	2.26	1.75	1.74
Variance	5.12	3.07	3.04
F-statistic		1.67[1])	1.68[2])
p-value		0.07	0.09

Source: OECD, Economic Outlook. – 1) a = USA, b = EU. – 2) a = USA, b = Euro area.

Thus, in order to isolate the independent impact of financial advancement on the business cycle *Hahn* (2003) chooses a panel regression approach taking pains to control for as many factors as statistically available and economically feasible. The regression analysis is based on a panel data set for 22 OECD countries built over the period 1970 through 2000. A six-period panel is used with the data averaged over non-overlapping five-year intervals aggregated over the periods 1971 through 1975, 1976 through 1980, with 1996 through 2000 representing the last period. The size of the interval is supposed to approximately cover a full length of a normal business cycle. Details as to the OECD countries covered, the variables defined and the data sources referred to are given in *Hahn* (2003), Appendix Table A.

As indicators for fluctuations, *Hahn* (2003) uses ex-post measures of volatility based on the historical data. As in the F-test done above, the standard deviation of the aggregate output gap (CY_SD) and, in addition, the absolute difference between the maximum and the minimum of the output gap (CY_DIFF) are used as indicators for macroeconomic volatility. Though these indicators are certainly imperfect output volatility measures they seem to portray sufficiently well those short-lived shocks which are mainly associated with the business cycle.

Further, CAP defined as the value of listed shares on domestic exchanges divided by GDP, LIQ defined as the value of the trades of domestic shares on domestic exchanges divided by GDP, and TURN defined as LIQ divided by CAP captures the strength of arm's length financing and, according to the reasoning in the preceding section, the level of overall financial sophistication. CAP measures the size of the stock market while LIQ and TURN are supposed to indicate the liquidity and efficiency level of the stock market, respectively. Obviously, TURN will not be affected by price effects, at least, not to the extent as are CAP and LIQ, respectively (*Hahn*, 2002).

As for a detailed description of the variables making up the conditioning and the interacting set of the regressions, respectively, we refer the reader to *Hahn* (2003).

The main findings of the regression analysis as carried out in *Hahn* (2003) are summarized in Table 2. The results indicate that even when a broad set of control and interaction variables is accounted for there is evidence supporting the view that financial sophistication has a role in destabilizing the business cycle in the OECD countries. What's more, the magnitude of the amplification of the aggregate output volatility due to stock market advancement appears not to be of a negligible order.

Table 2: Two-Stage Instrument Variable Estimation
1971 through 2000, five-year averages

Dependent Variables	CY_SD	CY_DIFF	CY_SD	CY_DIFF
Regressors				
$\ln(CAP)_t$	0.0020	0.0053		
	(0.032)	*(0.015)*		
$\ln(TURN)_t$			0.0023	0.0057
			(0.042)	*(0.032)*
Wald test for		p-values		
joint significance	0.000	0.000	0.000	0.000
joint dummy significance	0.000	0.000	0.000	0.000
time dummy significance	0.000	0.000	0.000	0.000
Sargan test[1)]	0.599	0.400	0.617	0.525
Serial correlation test				
AR(1)	0.469	0.734	0.541	0.760
AR(2)	0.083	0.098	0.148	0.157

Number of observations: 105; 21 OECD countries. – The regressions also include dummy variables for the different time periods that are not reported; the respective lagged one endogenous variable and private fixed investment divided by gross domestic product are added as additional instruments; as for the interaction and control variables included see Hahn (2003), Table 4; p-values in parentheses; heteroskedasticity-consistent standard errors are used. – [1]) The null hypothesis is that the instruments used are not correlated with the residuals.

4. Final Remarks

Building on the Ricardian-type model of *Saint-Paul* (1992) the paper explored the linkage between financial markets advancement and the severity of the business cycle. Though the model provides theoretical evidence that financial advancement is good for growth due to

making possible a higher degree of division of labor, it also shows that, for the same reason, finance may be bad for the business cycle. That is, the more developed is finance (or financial risk management), the higher is specialization and hence the larger are aggregate output fluctuations. Preliminary empirical evidence from OECD countries is presented which appears to be in line with this finding.

In accordance with the respective literature, the model also states that there is a tradeoff between income risk exposure and financial development. Though highly developed financial markets may cause larger output fluctuations, they also allow the consumers to diversify away their increased income risk which comes naturally with a high level of specialization. Interestingly, empirical evidence supporting this financial 'folk theorem' has so far been rather anecdotal.

References

Aiginger, K., Landesmann, M., "Competitive Economic Performance: The European View", WIFO-Working Paper, 2002, (179).

Baltagi, B. H., Econometric Analysis of Panel Data, John Wiley & Sons, New York, 1995.

Caballero, R., Hammour, M., "Speculative Growth", NBER Working Paper, 2002, (9381).

Denizer, C., Iyigun, M. F., Owen, A. L., "Finance and Macroeconomic Volatility", World Bank, Policy Research Paper, 2000, (2487).

Easterly, W., Islam, R., Stiglitz, J. E., Shaken and Stirred: Explaining Growth Volatility, World Bank, Washington, D.C., mimeo, 2000.

Green, W., Econometric Analysis, Prentice-Hall, Inc., 4th edition, 2000.

Hahn, F. R., "The Finance-Growth Nexus Revisited: New Evidence from OECD Countries", WIFO-Working Paper, 2002, (176).

Hahn, F. R., "Financial Development and Macroeconomic Volatility: Evidence from OECD Countries", WIFO-Working Paper, 2003, (198).

Ramey, G., Ramey, V. R., "Cross-Country Evidence on the Link between Volatility and Growth", American Economic Review, 1995, 85(5), p. 1138-1151.

Saint-Paul, G., "Technological Choice, Financial Markets and Economic Development", European Economic Review, 1992, (36), p. 763-781.

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