E C O N O M I C S B U L L E T I N

The Feldstein−Horioka puzzle and law

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Abstract

In this paper, we introduce a proxy for the legal protection of investors, a dummy variable that indicates legal origins, into the Feldstein and Horioka (1980, Economic Journal 90) saving−investment regression. The estimations show that in the French−civil−law countries, which have the weakest investor protection, the domestic investment rates are generally less strongly correlated with the domestic saving rates. This implies that in countries with less investor protection, the capital resulting from an increase of domestic saving tends to flow to foreign countries with stronger investor protection, rather than into domestic investment.

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1 Introduction

In the absence of regulation in international financial markets, the saving of any country would flow to countries with the most productive investment opportunities. Therefore, domestic saving rates would be uncorrelated with domestic investment rates. Feldstein and Horioka (1980), however, show that these correlation do exist in the OECD countries, where capital is relatively free to move. This fact is called the Feldstein-Horioka saving-investment puzzle. The saving-investment correlation is known to be robust to changes in time period: 1974-1986 (Feldstein and Bacchetta (1991)), 1986-1990 (Obstfeld (1995)), and so on. This fact is puzzling since the international financial markets today are less restrictive than they were in the periods estimated by Feldstein and Horioka. Numerous papers attempt to explain or interpret this with numerous reasons.[1] As noted by Obstfeld (1995, p. 244), however, "the cross-sectional finding . . . is more difficult to explain in a world of capital mobility."

This paper investigates the relationship between the saving-investment regression and law. In recent years, a number of papers have suggested a strong relationship between finance and law. Shleifer and Wolfenzon (2002) demonstrate theoretically that better investor protection leads to higher interest rates and eliminates the incentive for capital to flow to countries with poor protection of investors. On the empirical side, Demirgüç-Kunt and Maksimovic (1998) show that in countries with more efficient legal systems, a greater fraction of firms are financed by long-term external debt and equity. From these results, it is conjectured that domestic investment rates in countries with poor protection of investors should be less strongly associated with the domestic saving rates, whereas savings in countries with stronger protection are invested domestically.

Our approach is quite simple. We introduce a proxy for the legal protection of investors, a dummy variable that indicates legal origins, into the Feldstein and Horioka saving-investment regression. The dummy variable consists of four legal origins: English common law, French civil law, German civil law, and Scandinavian civil law. La Porta *et al.* (1996) show that English-common-law countries have the strongest legal protection of investors while French-civil-law countries have the weakest. Therefore, we anticipate that an increase of saving in French-civil-law countries will tend to flow into investment opportunities in foreign countries instead of domestic investment. If the protection of investors is still a problem in financial markets, then domestic investment rates could be correlated with domestic saving rates in

[1] See Obstfeld (1995) for a useful survey.

recent years.

The key finding of this paper is that French-civil-law countries, particularly in recent years, show a lower degree of association of domestic saving and investment rates than countries with other legal origins. This means that a large part of the saving-investment association is explained by legal origin. Since the dummy variable represents the level of investor protection, this suggests that the Feldstein-Horioka puzzle originates from the environment of investment.

The remainder of this paper is structured as follows. The next section extends the Feldstein-Horioka regression for the period from 1970 to 2000. Section 3 introduces the dummy variable of legal origin to the model. Section 4 concludes.

2 Simple Saving-Investment Regressions

Following Feldstein and Horioka (1980), we first estimate a linear saving-investment regression model,

$$(I/Y)_i = \alpha + \beta(S/Y)_i + \varepsilon_i \quad (i = 1, \ldots, n), \tag{1}$$

where $(I/Y)_i$ is the gross domestic investment rate, $(S/Y)_i$ is the gross national saving rate, and ε_i is the i.i.d. error with mean zero and variance σ^2. We assume the strict exogeneity, $\mathrm{E}(\varepsilon_i|1, (S/Y)_i) = 0$ for $i = 1, \ldots, n$, where $\mathrm{E}(\cdot)$ is an expectation operator. We estimate Equation (1) for a sample of 20 OECD countries in 1970-2000, i.e., $n = 20$. The data are from the Penn World Table 6.1 by Heston, Summers and Aten (2002). The sample includes Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States. $(I/Y)_i$ and $(S/Y)_i$ are averaged over the period. The hatted coefficients denote the ordinary least squares (OLS) estimates, hereafter.

Figure 1 plots the average ratio of domestic investment to GDP for the sample countries against the ratio of domestic saving to GDP. The vertical axis represents the domestic investment rate averaged in each period, and the horizontal axis is the average domestic saving rate. For each period, the distribution appears to have a positive slope. Moreover, it varies widely and the slope has been moderate in more recent periods. The saving-investment association remains, notwithstanding the freer recent capital mobility.

Table 1 shows the OLS estimation of Equation (1). The first column represents the results using the averaged data over 1970-2000. As estimated by Feldstein and Horioka, the coefficient from OLS, $\hat{\beta}$, is significantly different

from zero in our sample. For the estimations over decades, as shown in the second through fourth column, $\hat{\beta}$'s also reject the null hypothesis, but decrease in recent periods. Furthermore, The coefficient of determination, R^2, is relatively small in the 1990s. These results seem to reflect the deregulation and/or effectiveness of international capital mobility. The domestic saving and investment rates, however, are still strongly correlated.

3 Saving, Investment, and Law

Next we consider the relationship between the saving-investment association and investor protection. Extending Equation (1), we estimate

$$(I/Y)_i = \alpha_0 + \alpha_1 D_i + \beta_0 (S/Y)_i + \beta_1 D_i \cdot (S/Y)_i + \varepsilon_i. \tag{2}$$

where D_i is a dummy variable which is unity if the commercial code of country i originates from a certain legal system, and zero otherwise. Table 2 represents the legal origins for our sample countries, identified by La Porta *et al.* (1998). Following La Porta *et al.*, the commercial law is classified into four origins: English common law, French civil law, German civil law, and Scandinavian civil law. Each origin has significantly different degrees of protection for investors. In general, French-civil-law countries have the weakest investor protection while English-common-law countries have the strongest.

Figure 2 plots the ratio of domestic investment to GDP against the ratio of domestic saving to GDP for legal origins. The first row plots the data for English-common-law countries. In this case, the domestic saving and investment ratio are positively associated. Although the association appears to be weaker for 1970-1979, stable relations are shown in each sample period. For German-civil-law (third row) and Scandinavian-civil-law countries (fourth row), the relationships have stable positive slopes. In these samples, the slopes tend to be gentler in recent periods. For French-civil-law countries (second row), however, the saving-investment relations are ambiguous. In addition, the distributions vary in each period, so the relations are not stable. In particular, the slope is almost horizontal in 1990-2000, so that the domestic saving and investment ratio seem to have no relationship.

The OLS estimation of Equation (2) over 1970-2000 is shown in Table 3. For each legal origin, the $\hat{\beta}_0$'s are positive and significantly different from zero, and the relations are relatively strong. In English-common-law countries (first column), the coefficient of the dummy variable, $\hat{\beta}_1$, is positive and significant, so the saving and investment rates are strongly correlated. On

the other hand, $\hat{\beta}_1$ in French-civil-law countries (second column) is significantly negative, and hence these countries have weaker relations between saving and investment. In the German- and Scandinavian-civil-law countries (third and fourth column respectively), the coefficients of the dummies are not significant. As suggested by La Porta *et al.* (1998), English-common-law countries have the strongest investor protection while French-civil-law countries have the weakest. This fact is consistent with our results.

In order to check the robustness of this result, we estimate Equation (2) over the decades. In 1970-1979, $\hat{\beta}_1$ for English-common-law and French-civil-law countries have reverse signs. Yet, it is necessary to note that the distributions of these samples are unstable, and that the international capital market in the 1970s was more restrictive than in recent periods. In 1980-1989, the English-common-law countries' coefficient of dummy variable is not significant, whereas the French-civil-law countries' coefficient is significantly negative and its adjusted R^2 is relatively high. In 1990-2000, the $\hat{\beta}_1$ of French-civil-law countries is smaller than that in the 1980s in absolute value and is not statistically significant. However, the F-statistic under the null hypothesis that $\beta_0 + \beta_1 = 0$ is 0.508 and its p-value is 0.486. Therefore, in the French-civil-law countries in the 1990s, the hypothesis that the saving and investment rates were correlated is not rejected. The coefficient of the cross term in the German-civil-law countries is significantly positive. According to La Porta *et al.* (1998), German-civil-law countries have also strong investor protection. Therefore, this estimate is not inconsistent with their findings.

In the French-civil-law countries, on the whole, $\hat{\beta}_1$ is significantly negative, that is, the saving-investment association is weaker. Moreover, $\hat{\beta}_0 + \hat{\beta}_1$ in those countries is about half as small as in other countries. These results imply that the saving-investment association will largely depend on the level of investor protection.

4 Conclusion

In this paper, we have investigated the relationship between domestic saving-investment regression and law. Some recent papers suggest that countries with more protections for investors have more active investments. If so, the domestic investment rates in countries with high investor protection should be associated with domestic saving rates. In this paper, we introduced a proxy for the legal protection of investors, a dummy variable that indicates legal origins, into the Feldstein and Horioka's saving-investment regression. The estimations show that in the French-civil-law countries, which have the weakest investor protection, the domestic investment rates are generally less

strongly correlated with the domestic saving rates. This implies that in countries with less investor protection, the capital resulting from an increase of domestic saving tends to flow to foreign countries with stronger investor protection, rather than into domestic investment.

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Figure 1: Average Saving and Investment Rates

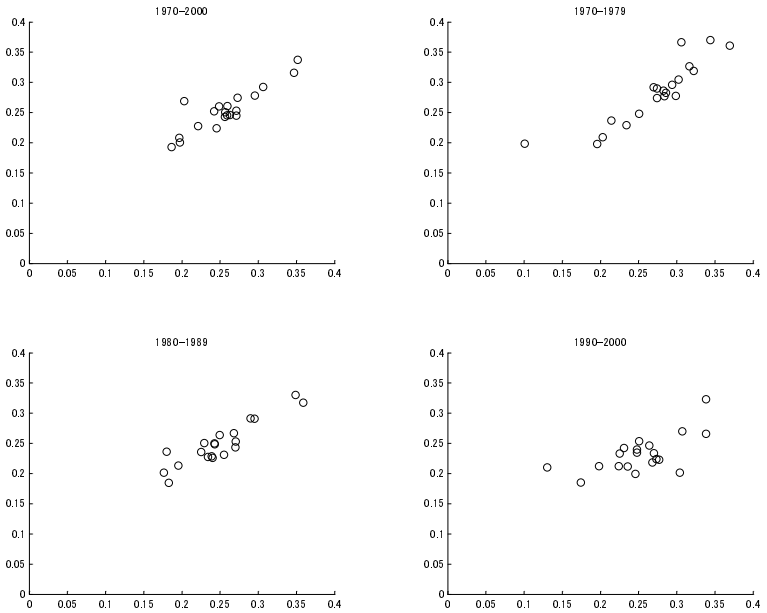

Table 1: Cross-Sectional Regressions of Investment Rates on Saving Rates

Coefficients	1970-2000		1970-1979		1980-1989		1990-2000	
$\hat{\alpha}$	0.072	***	0.072	**	0.080	***	0.134	***
	(0.022)		(0.025)		(0.018)		(0.028)	
$\hat{\beta}$	0.707	***	0.774	***	0.677	***	0.390	***
	(0.085)		(0.091)		(0.710)		(0.109)	
R^2	0.792		0.802		0.835		0.414	

Note: Standard errors are shown in parentheses. ***, **, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

Table 2: Sample Countries and Legal Origin

No	Countries	English	French	German	Scandinavian
1	Australia	1	0	0	0
2	Austria	0	0	1	0
3	Belgium	0	1	0	0
4	Canada	1	0	0	0
5	Denmark	0	0	0	1
6	Finland	0	0	0	1
7	France	0	1	0	0
8	Germany	0	0	1	0
9	Greece	0	1	0	0
10	Ireland	1	0	0	0
11	Italy	0	1	0	0
12	Japan	0	0	1	0
13	Netherlands	0	1	0	0
14	New Zealand	1	0	0	0
15	Norway	0	0	0	1
16	Spain	0	1	0	0
17	Sweden	0	0	0	1
18	Switzerland	0	0	1	0
19	United Kingdom	1	0	0	0
20	United States	1	0	0	0

Note: Legal origins are from La Porta *et al.* (1998).

Figure 2: Average Saving and Investment Rates by Legal Origins

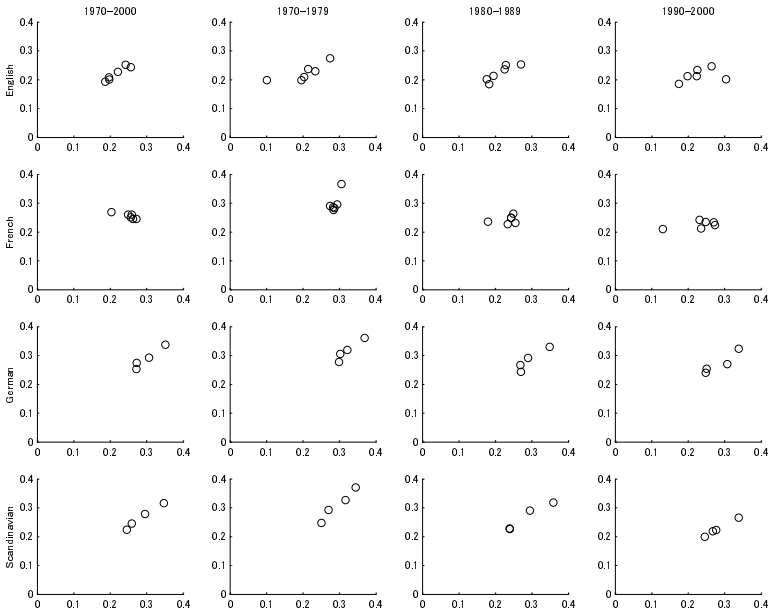

Table 3: Cross-Sectional Regressions of Investment Rates on Saving Rates and Legal Origins

Coefficients	Legal Origin							
	English		French		German		Scandinavian	
1970-2000								
$\hat{\alpha}_0$	0.099	***	0.043	***	0.090	***	0.072	**
	(0.033)		(0.012)		(0.027)		(0.025)	
$\hat{\alpha}_1$	-0.055		0.294	***	-0.080		-0.060	
	(0.068)		(0.413)		(0.083)		(0.067)	
$\hat{\beta}_0$	0.613	***	0.807	***	0.626	***	0.713	***
	(0.120)		(0.046)		(0.107)		(0.100)	
$\hat{\beta}_1$	0.199		-1.132	***	0.301		0.171	
	(0.298)		(0.163)		(0.280)		(0.236)	
adj. R^2	0.771		0.943		0.777		0.780	
1970-1979								
$\hat{\alpha}_0$	0.002		0.077	***	0.069	**	0.085	***
	(0.055)		(0.024)		(0.029)		(0.026)	
$\hat{\alpha}_1$	0.141	**	-0.508	*	-0.083		-0.127	
	(0.065)		(0.264)		(0.144)		(0.096)	
$\hat{\beta}_0$	1.015	***	0.748	***	0.794	***	0.719	***
	(0.184)		(0.087)		(0.108)		(0.095)	
$\hat{\beta}_1$	-0.616	**	1.790	*	0.227		0.472	
	(0.243)		(0.918)		(0.449)		(0.326)	
adj. R^2	0.843		0.814		0.776		0.800	
1980-1989								
$\hat{\alpha}_0$	0.088	***	0.063	***	0.093	***	0.082	***
	(0.026)		(0.017)		(0.021)		(0.022)	
$\hat{\alpha}_1$	-0.017		0.146	**	-0.080		-0.038	
	(0.051)		(0.054)		(0.072)		(0.050)	
$\hat{\beta}_0$	0.650	***	0.740	***	0.622	***	0.679	***
	(0.095)		(0.066)		(0.086)		(0.089)	
$\hat{\beta}_1$	0.060		-0.594	**	0.295		0.104	
	(0.223)		(0.225)		(0.250)		(0.181)	
adj. R^2	0.807		0.868		0.823		0.819	
1990-2000								
$\hat{\alpha}_0$	0.130	***	0.099	**	0.171	***	0.131	***
	(0.035)		(0.036)		(0.023)		(0.029)	
$\hat{\alpha}_1$	0.048		0.096		-0.118		-0.105	
	(0.064)		(0.060)		(0.070)		(0.100)	
$\hat{\beta}_0$	0.418	***	0.518	***	0.212	**	0.416	***
	(0.130)		(0.135)		(0.092)		(0.116)	
$\hat{\beta}_1$	-0.258		-0.382		0.553	**	0.293	
	(0.265)		(0.243)		(0.247)		(0.356)	
adj. R^2	0.387		0.400		0.670		0.433	

Note: Standard errors are shown in parentheses. ***, **, and * indicate statistical significance at 1, 5, and 10 percent, respectively.