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The Fundamental Determinants of Financial Integration in the European Union

By

Jan J. G. Lemmen and Sylvester C. W. Eijffinger

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I. Introduction

This paper focuses on the fundamental determinants of the degree of financial integration – or more precisely of the intensity of capital controls – in the European Union (EU) over the period 1974–1993.¹ Macroeconomic evidence seems to support the view that the integration between European financial markets has increased in recent years (Lemmen and Eijffinger 1993, 1995; Frankel et al. 1993). It fosters the impression that remaining differences in national economic and financial structures are unimportant. Moreover, it may tend to overstate the pressure towards, and hence the speed of integration. An obvious question, then, is what are the main determinants of financial integration. A thorough understanding of the determinants of the intensity of capital controls may provide important insight into the process of financial and monetary integration in Europe and may help in policy formulation.²

This paper improves analysis started by Epstein and Schor (1992) and Alesina et al. (1994) in a number of aspects. *First*, previous investigations of the determinants of capital controls (Epstein and Schor 1992; Alesina et al. 1994; Grujters 1995; Milesi-Ferretti 1995; Grilli and Milesi-Ferretti 1995) typically constructed dummy variables or capital control indices to measure the degree of financial integration.

Remark: We are grateful to Rudy Douven for generously providing the OECD Economic Outlook data diskettes. In addition, we thank Marco Hoeberichts and an anonymous referee for helpful comments and Jeannie Bovenberg for her excellent help in editing the paper. Of course, the usual disclaimer applies.

¹ The concepts of “financial integration” and “intensity of capital controls” are used interchangeably.

² Our argument is also demonstrated by the events during the exchange crises in the European Monetary System.

As we will argue, these measures are problematic because they do not account for different intensities of capital controls. We compute deviations from closed interest parity to measure the intensity of capital controls. Resulting negative (positive) deviations from closed interest parity are associated with capital export (import) restrictions. *Secondly*, Alesina et al. (1994) apply their analysis to the financial markets of 20 OECD countries. Grilli and Milesi-Ferretti (1995) apply their analysis to 61 developed and less developed countries. In practice, integration attempts across the world are more of a geographical nature. The EU financial markets can be seen as an excellent sample to test for the fundamental determinants of financial integration because they are in the process of institutional integration. Most legal barriers have been either removed or are scheduled to be removed. Furthermore, the EU has adopted a stronger form of harmonization for its financial services – a policy of mutual recognition whereby member states within the EU have agreed to allow financial intermediaries from other states to operate under home country rules and supervision. *Thirdly*, Alesina et al. (1994) apply Maximum Likelihood Estimation to estimate various logit/probit models. We innovatively apply a pooled cross-section time-series approach to identify the fundamental determinants of capital controls. The pooled cross-section time-series model allows us to include those authors' political variables along with other explanatory variables. Furthermore, several new explanatory variables were included in our analysis: the unemployment rate, the productivity in the business sector, the ratios of general government deficit, domestic credit, broad money and gross-fixed capital formation over gross domestic product (GDP) and the ratio of broad money over narrow money. We find that realized inflation, government instability and gross-fixed capital formation are the fundamental determinants of financial integration in the EU.

The paper is organized as follows. Section II provides a meaningful measure of financial integration, which is the dependent variable in our empirical analysis. As we will argue, the price measure – i.e., the closed interest rate differential – is particularly suited to measure the intensity of capital controls (lack of offshore interest rates in a number of countries forces us to construct a synthetic approximation of closed interest differentials using forward exchange rates). Section III identifies the fundamental determinants of capital controls. First, we briefly summarize the rationales for capital controls. Subsequently, we link these rationales to several analytical indicators. The empirical analysis is carried out for 11 EU countries over the period 1974–1993 for

which relevant data are available. Finally, Section IV concludes the paper.

II. Alternative Measures of the Degree of Financial Integration

This section addresses the definition and measurement of the dependent variable: the degree of financial integration. First, we argue that the *price* measure is to be preferred to concentrating on the *volume* of capital flows themselves. As markets become more integrated, asset prices often adjust in anticipation of capital flows that would otherwise occur. Consequently, the volume of capital flows is less suited to measure the degree of financial integration.³ In addition, the price measure is also to be preferred to more *legal* oriented approaches of capital controls. Since financial integration is essentially a legal concept, previous research on the determinants of financial integration (Epstein and Schor 1992; Alesina et al. 1994; Grujters 1995; Milesi-Ferretti 1995; Grilli and Milesi-Ferretti 1995) typically constructed dummy variables or capital control indices to measure the degree of financial integration. For example, Alesina et al. (1994) use dummy variables – taking the value 1 when capital controls are in place and 0 otherwise – to measure capital controls. Unfortunately, dummy variables cannot explain different degrees of intensity of capital controls over time (Epstein and Schor 1992: 143). Epstein and Schor construct an annual capital control index compiled from the summary table at the end of the International Monetary Fund's *Annual Reports on Exchange Arrangements and Exchange Restrictions*. This index is composed of restrictions on payments for capital transactions (i.e., capital controls) and the use of separate exchange rate(s) for some or all capital transactions and/or some or all invisibles (i.e., exchange controls). Both types of restrictions are given equal weight. If both restrictions are in place, the index takes the value of 2, if one restriction is in place the index takes the value of 1, and 0 otherwise. Capital control indices are already more capable of explaining different degrees of intensity of capital controls than dummy variables. Epstein and Schor (1992: 141), however, argue that the IMF definitions do not include some indirect measures against capital flows which might reasonably be considered capital controls (e.g., the interest equalization tax). Furthermore, the IMF does not distinguish

³ Besides, long time-series data on the volume of gross capital flows are not available (Kouri and Porter 1974).

between restrictions to limit capital outflows and restrictions to limit capital inflows (i.e., the direction of capital flows), and between restrictions on short-term and restrictions on long-term capital flows (i.e., the maturity of capital flows).

In our opinion, these aspects are of crucial importance for policy analysis. Grujters (1995: 198–213) tries to overcome these weaknesses and constructs two capital control indices to explain the intensity of capital import restrictions and the intensity of capital export restrictions, respectively. The indices are based upon a historical survey of direct and indirect capital control measures in 11 OECD countries. The measure implicitly embodies numerous types of restrictions, with some being more important than others across different countries. However, the major shortcoming endemic to all legal measures is the subjective element needed to construct them. Ample historical evidence suggests that there have been significant discrepancies between the legal and actual intensity of controls. Restrictions are not always binding (i.e., effective) or some indirect restrictions are simply not taken into account. As a result it may be a mistake to conclude that the market is segmented. The private sector is extremely creative in finding ways to move capital internationally. In countries with restrictions on capital mobility, the private sector has typically resorted to leads and lags in average payments terms for exports and imports to evade legal controls on capital flows.⁴ Moreover, the Eurocurrency market has played an important role in evading capital controls. So, one needs to go beyond legal restrictions in assessing the extent of capital mobility.

The measure we use takes account of *short-term* financial integration because forward exchange rates exist only for short horizons generally not exceeding one year.⁵ In the investigation design, the underlying financial assets differ only with respect to currency of denomination and country-specific regulation (e.g., capital controls and tax treatment), rather than with respect to asset-specific types of risk (e.g., default risk and liquidity risk) or other risk characteristics.⁶

⁴ Therefore, Milesi-Ferretti (1995) and Grilli and Milesi-Ferretti (1995) use a dummy variable for current-account restrictions to proxy for the intensity of capital controls.

⁵ Although currency swaps allow us to calculate deviations from covered interest rate parity for longer horizons, they are not available over a sufficiently long time horizon (Popper 1993).

⁶ Preferably, one might also want to disentangle the effect of nonresident interest rate withholding taxation. Interest withholding taxes importantly affect the pre-tax gross return demanded by international investors. Huizinga (1994) adjusts the interest rate

We argue that closed nominal interest rate differentials are most suited to capture differences in the intensity of capital controls. Our argument follows from the decomposition of *onshore* covered nominal interest rate parity in Table 1. This may be demonstrated by distinguishing between covered nominal interest parity in *onshore* markets (for comparable assets in different political jurisdictions and restrictions on cross-border capital flows) and covered nominal interest parity in *offshore* markets (for comparable assets in the same political jurisdiction and no restrictions on cross-border capital flows). Each of the components $\phi_{Domestic}$, $\phi_{Foreign}$ and ϕ_{Euro} provides information on the source of the onshore covered nominal interest rate differential. $\phi_{Domestic}$ measures the extent to which *domestic* controls are the cause of a non-zero onshore covered nominal interest rate differential. Similarly, $\phi_{Foreign}$ measures the extent to which *foreign* controls contribute to a non-zero onshore covered nominal interest rate differential. Finally, ϕ_{Euro} measures deviations from covered interest arbitrage in offshore markets. We assume that interest arbitrage ensures that differences from covered interest rate parity in offshore markets (ϕ_{Euro}) are negligible. Since banks in Euromarkets set Euro-interest rates of the domestic country (say the Euro-sterling rate) equal to foreign Euro-interest rates (say the Euro-deutsche mark rate) adjusted for the forward premium (discount) on the domestic currency, *offshore* covered nominal interest parity will always hold in Euromarkets. Deviations in the Euromarket are largely due to technical factors and/or transactions costs (Giavazzi and Giovannini 1989: 172). Under this assumption, the domestic onshore-offshore interest rate differential may be approximated by the adjusted domestic covered nominal interest rate differential. Consequently, the domestic intensity of capital controls may either be measured by the domestic onshore-offshore closed nominal interest rate differential

$$\phi_{Domestic} = i_{t,t+k} - i_{t,t+k}^{Euro} \quad (1)$$

or by the adjusted domestic covered nominal interest rate differential

$$\xi_{Domestic} = i_{t,t+k} - i_{t,t+k}^{*Euro} - (f_t^{t+k} - s_t). \quad (2)$$

parity condition for the effect of nonresident interest withholding taxation. Since the effects of interest rate withholding taxation are difficult to grasp, we leave this aspect for further research.

Table 1 – *The Decomposition of the Onshore Covered Nominal Interest Rate Differential and the Measure for the Intensity of Capital Controls*

<i>Decomposition</i>	
Offshore covered nominal interest rate differential:	
$\phi_{Euro} = i_{t,t+k}^{Euro} - i_{t,t+k}^{*Euro} - (f_t^{t+k} - s_t).$	(1)
Domestic onshore-offshore closed nominal interest rate differential:	
$\phi_{Domestic} = i_{t,t+k} - i_{t,t+k}^{Euro}.$	(2)
Foreign offshore-onshore closed nominal interest rate differential:	
$\phi_{Foreign} = i_{t,t+k}^{*Euro} - i_{t,t+k}^*.$	(3)
Onshore covered nominal interest rate differential:	
$\begin{aligned} \phi &= \phi_{Domestic} + \phi_{Foreign} + \phi_{Euro} = i_{t,t+k} - i_{t,t+k}^* - (f_t^{t+k} - s_t) \\ &= [i_{t,t+k} - i_{t,t+k}^{Euro}] + [i_{t,t+k}^{*Euro} - i_{t,t+k}^*] + [i_{t,t+k}^{Euro} - i_{t,t+k}^{*Euro} - (f_t^{t+k} - s_t)]. \end{aligned}$	(4)
(4) = (1) + (2) + (3)	
<i>Measure for the intensity of capital controls</i>	
The domestic intensity of capital controls may be approximated by the adjusted domestic covered nominal interest rate differential:	
$\xi_{Domestic} = \phi - \phi_{Foreign} = \phi_{Domestic} + \phi_{Euro} = i_{t,t+k} - i_{t,t+k}^{*Euro} - (f_t^{t+k} - s_t),$	
while the foreign intensity of capital controls may be approximated by the adjusted foreign covered nominal interest rate differential:	
$\xi_{Foreign} = \phi - \phi_{Domestic} = \phi_{Foreign} + \phi_{Euro} = i_{t,t+k}^{Euro} - i_{t,t+k}^* - (f_t^{t+k} - s_t),$	
where banks ensure that offshore covered nominal interest rate parity holds continuously. That is,	
$i_{t,t+k}^{Euro} = i_{t,t+k}^{*Euro} + (f_t^{t+k} - s_t) \quad \text{and} \quad i_{t,t+k}^* = i_{t,t+k}^{Euro} - (f_t^{t+k} - s_t).$	
<i>Symbols</i>	
$i_{t,t+k}$	= domestic onshore nominal rate of interest a time t on a k -period bond held between time t and $t+k$
$i_{t,t+k}^{Euro}$	= domestic offshore nominal rate of interest at time t on a k -period bond held between time t and $t+k$
f_t^{t+k}	= forward exchange rate at time t for the delivery of foreign currency at time $t+k$
s_t	= spot exchange rate at time t (defined as units of domestic currency per unit of foreign currency)
k	= holding period of the underlying debt instrument
$*$	= denotes a foreign variable

Source: Goldsbrough and Teja (1991) and authors' own summary of the literature.

Domestic capital controls will be an important reason for significant deviations from onshore closed interest parity.⁷ Since offshore covered nominal interest rate parity is zero by assumption, it follows that any differential between the Euro rate and the domestic rate on a comparable asset is likely to reflect domestic capital controls.⁸ Closed and adjusted covered nominal interest rate differentials have been widely used to measure the intensity of capital controls. The closed and adjusted covered nominal interest differentials – we will refer to as country risk premia – primarily reflect the joint influence of existing and expected capital controls (i.e., political risks) (Aliber 1973: 1453). They indicate agents' ability to move financial assets across national borders. Finally, note that care must be exercised in taking the closed interest rate differentials as an indication of the intensity of capital controls, since differences in asset-specific types of risk cannot be completely excluded.⁹

Annual series of closed interest rate parity for Germany, France, the Netherlands and the United Kingdom may be derived as follows (see the Appendix at the end of the paper):¹⁰

$$\phi_{Domestic}^{Year} = \sum_{j=1}^{j=12} \frac{[i_{t,t+3} - i_{t,t+3}^{Euro}]_j}{12}. \quad (3)$$

Unfortunately, Euro-interest rates are not available for Austria, Belgium, Denmark, Finland, Italy, Spain and Sweden. Therefore, for these countries we calculate annual series of adjusted covered nominal interest rate differentials (see the Appendix):

$$\zeta_{Domestic}^{Year} = \frac{\sum_{j=1}^{j=12} [i_{t,t+3} - i_{t,t+3}^{*Euro} - (f_t^{t+3} - s_t)]_j}{12}, \quad (4)$$

⁷ More precisely, capital controls that are economically significant – thus lying outside a small band of differentials created by transaction costs.

⁸ This reasoning applies to both direct or quantitative measures (consisting of outright restrictions or prohibitions of certain capital transactions) and indirect or cost measures (affecting the operations of the banking and nonbanking sector). Numerous qualitative studies exist that describe the introduction and workings of capital control measures.

⁹ The price measure may be more informative about country-specific regulation using treasury bill rates with the same default risks. Unfortunately, treasury bill rates are unavailable for all EU countries considered, or the depth of the treasury bill market is low (Cumby and Obstfeld 1984: 132 and Appendix A).

¹⁰ Data for Germany refer to the Federal Republic of Germany before the unification of Germany.

which is equivalent to the closed interest rate differential under the assumption of covered interest rate parity in offshore markets. Three-month Euro DM interest rates are used to calculate the adjusted domestic covered nominal interest rate differentials. Furthermore, we use own cross-rate calculations of spot and forward exchange rates of EU countries vis-à-vis the D-mark based upon end-of-period spot and forward exchange rates vis-à-vis the US dollar. Henceforth, when we speak about closed interest differentials we also mean adjusted covered interest rate differentials.

III. The Fundamental Determinants of Financial Integration in the European Union: Empirical Results and Interpretation

This section identifies empirically the fundamental determinants of financial integration in the EU. We take an eclectic approach to identify the fundamental determinants of financial integration in the EU. Before turning to the estimation results, we will briefly describe the main rationales for capital controls. In addition, we offer some analytical indicators for the relevant determinants of capital controls.¹¹ The following explanations have been given in the literature for the introduction of capital controls:¹²

Monetary determinants

Possible candidate determinants of capital controls with respect to monetary policy are realized inflation (*INF*), domestic credit (*CRED*) and broad money (*M2*).¹³ In integrated financial markets monetary policy cannot control interest rates and exchange rates simultaneously without the use of another instrument – capital controls. Controls on capital inflows are intended to keep a strong currency from becoming stronger. Controls on capital outflows are intended to support a weak currency. The imposition of capital controls allows the authorities to

¹¹ These analytical indicators are partly justified by previous findings of Alesina et al. (1994).

¹² Several authors have dealt with the issue of the rationales for capital controls (see, for example, Cairncross 1973; OECD 1980, 1990a; BIS 1990; Goldstein et al. 1991; Bacchetta 1993; Mathieson and Rojas-Suarez 1993, 1994).

¹³ Since related attributes such as the inflation tax and seigniorage revenue are strongly positively correlated with the inflation rate, they are not included in the analysis. Similarly, the depreciation of the exchange rate is not included in the analysis since it is highly positively correlated with the inflation rate. In addition, the depreciation of the exchange rate is less well suited since it involves also foreign policy behaviour.

pursue “inconsistent” monetary policies for a while.¹⁴ Consequently, high (low) levels of *INF*, *CRED* and *M2* may indicate the increased presence of capital export (import) controls.

Fiscal determinants

We conjecture that the ratio of general government deficits to GDP (*DEF*) may be a relevant indicator for the intensity of capital controls. Capital controls may help to smooth and/or delay necessary internal adjustments to outside pressures. Governments with large budget deficits relative to GDP are expected to impose more capital export restrictions to preserve the tax base.

Political determinants

Possible political determinants of capital controls are the proxy for the political leaning of the government (*LEFT*) and the proxy for the political instability of countries (*SIGGOV*), respectively. Left-wing governments are hypothesized to favour the taxation of capital income over that of labour income. They are tempted to introduce capital controls to prevent capital export to maintain a large domestic tax base for capital levies (Alesina et al. 1994). We introduce the dummy variable *LEFT*, taking the value 1 when a left-wing government is in place and the value 0 otherwise (see the Appendix). Furthermore, we expect political unstable countries to have more capital export restrictions. We proxy the political instability of countries with the frequency of significant government changes (*SIGGOV*) as constructed by De Haan and Van 'tHag (1995) (see the Appendix).¹⁵

Institutional determinants

Possible institutional determinants of capital controls are the proxy for the independence of the central bank (*ES*) and the proxy for the flexibility of the exchange rate arrangement (*EXR*). The incentive of the government to impose capital controls depends on the degree

¹⁴ The OECD (1990a: 23) argues: “Thus, exchange controls have been often viewed as a means whereby the authorities may seek to insulate, at least temporarily, domestic credit expansion from monetary developments abroad and increase the autonomy with which the supply of money can be steered to influence domestic objectives.” See also the articles of Eichengreen et al. (1995: 162–172), Garber and Taylor (1995: 173–180) and Kenen (1995: 181–192).

¹⁵ The Grilli et al. (1991) index of significant government changes gives similar results. However, this index is not available for Finland and Sweden.

of control the government has over monetary policy. The control the government acquires over monetary policy depends (among other things) on the degree of independence of the central bank. We employ the Eijffinger-Schaling index (*ES*) of central bank independence, since it is available for all EU countries considered (see the Appendix).¹⁶ For the Eijffinger-Schaling index, the following rule applies: the higher the score ranging from 1 to 5, the more independent the central bank. Thus, we hypothesize: the less independent the central bank, the more capital export controls are expected to be in place. Ensuing, we argue that countries participating in less flexible exchange rate arrangements are more inclined to use capital export controls. To that end, we construct an index variable *EXR* of exchange rate flexibility taking the value of 2 during periods of minimal flexibility, i.e., the exchange rate flexibility is limited in terms of a cooperative arrangement under mutual intervention arrangements (the "snake" or EMS), 1 during periods of intermediate flexibility (i.e., the exchange rate is maintained within relatively narrow margins in terms of a single currency (D-mark or US dollar) or a composite of currencies (ECU)), and the value of 0 during periods of maximal flexibility (i.e., more flexible arrangements) (see the Appendix). Our index variable *EXR* differs from the dummy variable constructed by Alesina et al. (1994) where periods of minimal and intermediate flexibility take the value 1 and periods with maximal flexibility take the value 0.

Structural determinants

Relevant *financial* structure arguments for capital controls are the ratio of general government debt to GDP (*DEBT*) and the ratio of broad money (M2) over narrow money (M1) (*M2M1*). Relevant *economic* structure arguments for capital controls are the ratio of current account balance to GDP (*CA*), the unemployment rate (*UN*), the productivity in the business sector (*PROD*), the ratio of gross fixed capital formation to GDP (*GCF*) and the openness of the economy (*OPEN*). Some structural determinants of capital controls may actually apply more to long-term capital flows. So, in the empirical analysis we should find them to be less significant.

¹⁶ Cukierman's legal index (*LVAU*) of central bank independence which is also available for all EU countries in our sample gives similar results. The Grilli et al. (1991) total (economic and political) index of central bank independence also gives similar results. However, this index is not available for all EU countries. The same holds for the Alesina (1988, 1989) and the Bade-Parkin (1988) legal indices of central bank independence.

The structure and regulation of the domestic financial system is at the heart of the use of capital controls. The rationale for capital controls and regulation of domestic financial markets basically results from the desire to avoid systemic risk. Governments with large proportions of gross debt relative to GDP (*DEBT*) are expected to impose more capital export controls. In addition, we hypothesize that countries with less-developed financial markets typically impose more capital controls. Less-developed financial markets are characterized by relatively low ratios of broad money (*M2*) over narrow money (*M1*) (*M2M1*); that is, the development of more sophisticated deposit instruments is relatively low.¹⁷

Countries typically have implemented capital control measures to facilitate the financing of current account deficits (*CA*). We expect countries with large current account deficits (surpluses) to impose capital export (import) restrictions. Note however, that countries generally show asymmetric behaviour with respect to targeting the current account: capital export restrictions with current account deficits, no capital import restrictions with current account surpluses. Another argument for capital controls is derived from possible differences between private and social returns. This argument has been used particularly in relation to direct foreign investment. The OECD (1990a: 26) argues: "Whereas a private investor will invest abroad if the after-tax return from foreign assets is higher than the domestic return, the social return to the home country of the investment may be less than that of a domestic investment since the employment, production and tax-revenue benefits accrue to the host country." Capital controls can be used to retain domestic savings at home by reducing the return on foreign assets and by limiting access to foreign assets. Thus, capital export controls may help to raise investment in the domestic economy and, hence, economic growth. A relevant indicator for the private return is the productivity in the business sector (*PROD*). The productivity in the business sector reflects the attractiveness of domestic financial markets as the potential location of foreign capital. The productivity in the business sector provides an indication of the direction of capital flows and, hence, for the objec-

¹⁷ Unfortunately, it is rather difficult to find relevant indicators of financial market structure. Due to data availability we had to employ rather crude measures of financial market structure. Of course, there are more relevant indicators such as the market share of the five largest banks, or the number of bank branches per 100,000 inhabitants etc. (see, for example, King and Levine 1993 and Cottarelli and Kourelis 1994). Since data are difficult to obtain, we leave this for further research.

tive of capital controls. Low productivity in the business sector may be an influential argument for restricting capital exports.

A relevant indicator for investment is the ratio of gross fixed capital formation over GDP (*GCF*). The lower (higher) *GCF*, the lower (higher) collateral for the loan, the higher (lower) the interest rate, the less (more) capital export restrictions are expected to be in place. With relatively closed financial markets, domestic investors are obliged to invest in the domestic economy. The unemployment rate (*UN*) may be a relevant indicator of social costs. With relatively high unemployment rates more capital export restrictions are expected to be in place. Another relevant indicator of capital controls may follow from the openness of the economy (*OPEN*). With high openness capital controls are less effective, so they are less likely imposed. On the other hand, one may argue, with high openness capital controls may shield the economy from foreign competition, so they are more likely imposed. So, the correct argument still has to be decided upon.

Now, we turn to the estimation results. The intention was to use publicly available data sources (see the Appendix). Using a pooled cross-section time-series regression model, the following general specification for closed interest differentials can be postulated. The expected signs of the parameters are shown in parentheses under the variables. The subscript *i* represents the countries in our sample ($i = 1, \dots, N$) and the subscript *t* is the time subscript ($t = 1, \dots, T$).

$$(i - i^{Euro})_{i,t} = f [C, INF, CRED, M2, DEF, LEFT, SIGGOV, ES, EXR, DEBT, M2M1, CA, UN, PROD, GCF, OPEN]_{i,t} + \varepsilon_{i,t}$$

$(-)$ $(-)$ $(-)$ $(-)$ $(-)$ $(-)$ $(-)$ $(+)$ $(-)$
 $(-)$ $(+)$ $(+)$ $(-)$ $(+)$ $(-)$ $(?)$

(5)

with

- $(i - i^{Euro})$ = closed nominal interest rate differential
- C* = constant term
- INF* = inflation rate
- CRED* = total domestic credit to the economy as percentage of GDP
- M2* = broad money as percentage of GDP
- DEF* = general government deficit as percentage of GDP
- LEFT* = proxy for the political leaning of the government
- SIGGOV* = proxy for government instability
- ES* = Eijffinger-Schaling index of central bank independence

<i>EXR</i>	= proxy for the flexibility of the exchange rate arrangement
<i>DEBT</i>	= general government gross debt as percentage of GDP
<i>M2M1</i>	= ratio of broad money over narrow money
<i>CA</i>	= current account balance as percentage of GDP
<i>UN</i>	= unemployment rate
<i>PROD</i>	= productivity in the business sector
<i>GCF</i>	= gross fixed capital formation as percentage of GDP
<i>OPEN</i>	= openness of the economy
ε	= a normally distributed error term with zero mean and constant variance ($\varepsilon \sim N(0, \sigma_\varepsilon^2)$) and the regressors are completely independent of the error term.

The frequency of the data was dictated by the absence of higher frequency data on important macroeconomic determinants of financial integration and by the fact that we want to evaluate long-term trends in financial integration. To overcome problems of multicollinearity, we apply a "bottom-up" approach. First, we start with the inclusion of monetary policy determinants of capital controls. Then, we add fiscal policy determinants and test whether the explanatory power of the regression improves significantly (Wald test), and so forth. We average the country time series for five-year periods (1974–1978, 1979–1983, 1984–1988, 1989–1993) to avoid multicollinearity problems endemic to such time series. Furthermore, it removes the problem of cyclical biases in some of the right-hand variables (for example, the cyclical variations in government deficits). The sample contains 43 observations (one observation is lost due to the lack of forward exchange rate data for Italy over the period 1974–1976). The Ordinary Least Squares results are reported in Table 2. Furthermore, Table 2 also reports various diagnostic tests. In each case the models pass the diagnostic tests.

Which determinants do best in explaining closed interest differentials? From Table 2 it can be immediately seen that only three variables are significantly related to the intensity of capital controls: the realized inflation rate (*INF*), the frequency of significant government changes (*SIGGOV*) and gross fixed capital formation (*GCF*). The other variables are not found to be significant.

The regressions show that the realized inflation rate (*INF*) significantly explains the presence of capital export restriction in the EU. By now, considerable agreement exists across studies (Alesina et al. 1994 and Milesi-Ferretti 1995) that inflation critically rationalizes the presence of capital export controls (compare the magnitude of the esti-

Table 2 – The Fundamental Determinants of Capital Controls in the EU: Empirical Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
C	1.42 (3.76)	1.76 (1.72)	1.27 (1.32)	1.19 (2.80)	1.52 (3.35)	2.00 (4.38)	2.08 (2.33)	2.00 (3.25)	1.46 (2.40)	2.89 (3.96)	2.06 (4.51)	1.62 (0.48)	-1.87 (0.59)	4.31 (3.07)	4.70 (2.87)
INF	-0.31* (6.48)	-0.32* (5.79)	-0.31* (6.25)	-0.31* (6.45)	-0.31* (6.38)	-0.31* (6.79)	-0.31* (5.87)	-0.31* (6.29)	-0.29* (5.77)	-0.33* (7.07)	-0.34* (6.62)	-0.30* (6.02)	-0.24* (3.27)	-0.28* (5.99)	-0.29* (5.79)
CRED		-0.003 (0.35)													
M2			0.002 (0.18)												
DEF				-0.07 (1.23)											
LEFT					-0.18 (0.40)										
SIGGOV						-0.24* (2.10)	-0.24* (2.06)	-0.24* (1.82)	-0.30* (2.47)	-0.27* (2.35)	-0.22* (1.93)	-0.25* (2.53)	-0.26* (2.66)	-0.21* (1.84)	-0.19* (1.62)
ES							-0.02 (0.11)								
EXR								-0.00003 (0.0001)							
DEBT									0.01 (1.31)						
M2M1										-0.22 (1.55)					
CA											0.12 (1.15)				
UN												0.05 (1.06)			
PROD													0.04 (1.23)		
GCF														-0.12* (1.74)	-0.13* (1.78)
OPEN															-0.004 (0.48)
S.E.	1.24	1.25	1.25	1.23	1.25	1.19	1.20	1.20	1.18	1.17	1.18	1.19	1.18	1.16	1.17
ARCH(1)	0.02 (0.87)	0.006 (0.93)	0.04 (0.85)	0.19 (0.67)	0.02 (0.89)	0.007 (0.93)	0.01 (0.92)	0.007 (0.93)	0.03 (0.86)	0.09 (0.76)	0.11 (0.74)	0.0004 (0.98)	0.0004 (0.98)	0.30 (0.58)	0.38 (0.54)
R ²	0.49	0.48	0.48	0.50	0.48	0.53	0.52	0.52	0.54	0.55	0.54	0.53	0.54	0.55	0.55
N	43	43	43	43	43	43	43	43	43	43	43	43	43	43	43

S.E. is the standard error of the regression. – ARCH(1) is the Engle (1982) Lagrange Multiplier test for first order Autoregressive Conditional Heteroskedasticity ($\chi^2(1)$ distribution, probability value in parentheses). – $\bar{R}^2$ is the coefficient of determination adjusted for degrees of freedom. – N is the number of usable observations. – * indicates that the coefficient is significantly different from zero at the 95% level of confidence (one-tailed test). – Absolute t-statistics are given in parentheses.

Source: See the Appendix.

mated coefficients). Giavazzi and Giovannini (1989) have argued that in the beginning of the EMS the maintenance of capital controls was an essential feature of the functioning of the EMS. In integrated financial markets monetary policy cannot control interest rates and exchange rates simultaneously, without the use of another instrument – capital controls. If the authorities of weak-currency countries wish to avoid or delay the realignment they will be obliged to raise the domestic interest rates to make investors indifferent to the choice between holding domestic and foreign assets. However, high interest rates are frequently undesirable for domestic reasons (economic growth, debt burden). Restrictions on capital export, then, may (temporarily) sustain the pressure for the domestic interest rate to rise. Capital controls (temporarily) prevent or discourage speculative capital outflows (Wyplosz 1988: 95). Foreigners engaged in speculative transactions will now turn to the offshore markets, creating large offshore-onshore interest rate differentials.

Strong evidence is found for the intensity of capital controls to depend negatively (i.e., capital export controls are more likely) on the instability of the government as measured by the frequency of significant government changes (*SIGGOV*). In the years 1992 and 1993, relatively large closed interest differentials occurred in Denmark, Italy, Spain, Sweden and the United Kingdom despite complete removal of capital controls in the EMS countries as from 1 July, 1990. With respect to Spain these deviations probably reflected the temporary reintroduction of capital controls while with respect to the other countries political risks such as the fear of renewed introduction of capital controls have contributed to such deviations.

No evidence is found for justifying an important role for fiscal and institutional determinants of capital controls. Probably, realized inflation and government instability may perfectly account for this result. Countries with high inflation rates and unstable governments are often associated with high government deficit and debt ratios. Furthermore, countries with high inflation rates and unstable governments are known to have less independent central banks, and to have more frequent exchange rate changes (devaluations).

Equation (14) gives a satisfactory explanation of closed interest differentials in the EU. In particular, realized inflation, government instability and gross fixed capital formation (a proxy for investment) are shown to have a strong and significant influence on closed interest differentials in the EU. The coefficient with respect to gross fixed capital formation (*GCF*) is correctly signed and moderately signifi-

cant. Importantly, this variable was not included in previous research by Alesina et al. (1994).

Finally, we should mention some critical measurement issues. First, the relationship between the intensity of capital controls and its explanatory variables is often subject to uncertainty. The finding of no significant association with the intensity of capital controls may simply reflect the crudeness of the measured dependent and independent variables and/or the loss of information due to the use of five-year averages. Secondly, controls on capital outflows may also reduce capital inflows, as foreign investors worry about their ability to transfer income outside the country. Furthermore, a country may impose both capital import as well as capital export restrictions. These aspects of capital controls are difficult to grasp. Lastly, future research may want to consider closed interest parity for long-term bonds (calculated with the help of interest rate swaps) as it is unclear whether the results go through in financial assets with maturities of say more than 1 year.

IV. Conclusions

The estimates show that realized inflation, government instability and gross fixed capital formation can provide a reasonable explanation of closed interest differentials in the EU. Realized inflation clearly tends to exert the strongest influence on closed interest differentials, followed by government instability and gross fixed capital formation. Apparently, the most important implication of increased financial integration is that it forces a greater degree of interest rate parity across countries, and that it reduces the scope for independent monetary policy. After allowing for realized inflation, remaining differentials from closed interest parity may be explained by political risks imposed by the international financial community on particular countries. These political risks are basically attributed to political instability approximated by the number of significant government changes.

Furthermore, we would like to emphasize that government deficits, current account deficits and the productivity in the business sector are correctly signed but insignificantly related to closed interest differentials. Therefore, the adverse effect of inconsistent monetary and fiscal policies with concomitant large government deficits, current account deficits and low productivity in the business sector may be of some importance in explaining the intensity of capital controls in the long run.

In accordance with Alesina et al. (1994) we find capital export controls to be more likely in countries with high inflation rates and significant government changes. In contrast with Alesina et al. (1994), we also find gross fixed capital formation to be a relevant determinant of capital control intensity. Capital export controls increase the domestic supply of capital and consequently lower the domestic interest rate. Furthermore, this paper emphasizes the importance of closed interest differentials to measure the intensity of capital controls which enables us to distinguish between restrictions to limit capital outflows and restrictions to limit capital inflows (i.e. the direction of capital flows). Finally, we should highlight the impact of (differences in) national economic and financial structures on financial integration. With capital controls increasingly being eliminated, we expect the underlying characteristics of economic and especially financial market structure to become increasingly important for the determination of closed nominal interest rate differentials in the future. Monetary and fiscal policy in the EU are expected to become increasingly dependent on varying economic and financial structures, rather than on financial integration.

Appendix

Data Sources for the Dependent Variable
and the Independent Variables

I. The Dependent Variable

Variable	Countries
$\phi_{Domestic}^{Year} = \frac{\sum_{j=1}^{j=12} [i_{t,t+3} - i_{t,t+3}^{Euro}]_j}{12}$	Germany, France, The Netherlands, United Kingdom
$\xi_{Domestic}^{Year} = \frac{\sum_{j=1}^{j=12} [i_{t,t+3} - i_{t,t+3}^{*Euro} - (f_t^{t+3} - s_t)]_j}{12}$	Austria, Belgium, Denmark, Finland, Italy, Spain, Sweden

1. Representative Three-Month Domestic Money-Market
Interest Rates

Finding consistent comparable interest rate data for the EU countries under consideration is far from easy. To the extent possible, given data availability over long sample periods, we tried to use publicly

available representative three-month money-market interest rates (monthly series). The integration of one segment of the money market, that is taking one asset among many, may give a misleading impression of the overall short-term mobility of capital. This problem may partly be overcome by the use of representative short-term interest rates. Quoting the OECD (1990: 45): “[...] the aim has not necessarily been to take the same rate for all countries, but to choose the rates which are the most typical or the most revealing, or again, those which may be described as the ‘reference’ rates. In drawing up the following norms, while attention has, of course, been given to ensuring as much international comparability as possible, it has nevertheless been necessary to have regard for the fact that the methods of calculation used by countries to some extent reflect the institutional features of their financial markets.”

Country	Period	Description	Source
Austria	January 1974–December 1993	3-month vibor	OECD <i>FSM</i>
Belgium	January 1974–December 1993	3-month treasury bills	OECD <i>FSM</i>
Denmark	January 1974–December 1975	Central bank deposit certificates	OECD <i>FSM</i>
Finland	January 1976–December 1993	3-month interbank rate	OECD <i>MEI</i>
	January 1974–April 1987	Average cost of central bank financing	OECD <i>FSM</i>
France	May 1987 –December 1993	3-month helibor	OECD <i>FSM</i>
	January 1974–December 1993	3-month pibor	OECD <i>FSM</i>
Germany	January 1974–December 1993	3-month fibor	OECD <i>FSM</i>
Italy	January 1974–December 1993	3-month treasury bills	OECD <i>FSM</i>
Netherlands	January 1974–December 1985	3-month loans to local authorities	OECD <i>FSM</i>
Spain	January 1986–December 1993	3-month aibor	OECD <i>FSM</i>
	January 1974–December 1976	Rates charged: Short-term credits up to 3 months	OECD <i>FSM</i>
Sweden	January 1977–December 1993	3-month interbank loans	OECD <i>FSM</i>
	January 1974–December 1981	3-month treasury bills	OECD <i>FSM</i>
	January 1982–December 1993	3-month discount notes	OECD <i>FSM</i>
United Kingdom	January 1974–December 1993	3-month interbank rate	OECD <i>FSM</i>
OECD <i>FSM</i> = OECD <i>Financial Statistics Monthly</i> , Part I.			
OECD <i>MEI</i> = OECD <i>Main Economic Indicators</i> .			

2. Representative Three-Month Euro Money-Market Interest Rates

These rates are available for the following EU countries: Germany, France, the Netherlands and the United Kingdom (monthly series). Source: OECD *Financial Statistics Monthly*, Part I.

3. Three-Month Forward Exchange Rates vis-à-vis the D-mark

The following are our own cross-rate calculations of forward exchange rates of EU currencies vis-à-vis the D-mark based upon end-of-period three-month forward exchange rates vis-à-vis the US dollar (monthly series). The forward exchange rates are expressed as premiums (+) and discounts (–) on the forward value of the currency relative to its spot price. Defining the spot rate as currency units per US dollar, the formula for the forward premium on the currency in percent per annum is:

$$\frac{(s_t - f_t^{t+3}) \cdot 4 \cdot 100}{s_t}.$$

The annualized forward premium or discount is based on a 360-day year, and the three-month forward rate is the rate for 90 days, yielding the factor 4 that is employed in the formula. Since direct D-mark forward (and spot) exchange rates are not available for all EU countries considered and/or over a sufficiently long period, we used cross-rate calculations of forward and spot exchange rates of EU currencies vis-à-vis the D-mark based upon forward exchange rates vis-à-vis the US dollar. Concerning these cross-rate calculations, we already *presume* in the investigation design perfect capital mobility. However, this is only possible on the basis of the assumption of perfect arbitrage between markets of foreign exchange. Due to transactions costs in triangular arbitrage, cross-rate calculations do not exactly correspond to direct quotations. In constructing D-mark forward and spot exchange rates, dollar cross-rate calculations are preferred because of the reserve currency status of the dollar, the role of the dollar as the world's major intervention currency and the scale and efficiency of the US financial markets. Forward exchange rates for Italy are only available from January 1977 onwards. Source: IMF (1985) and IMF *International Financial Statistics*, line 60f.

4. Spot Exchange Rates vis-à-vis the D-mark

Own cross-rate calculations of spot exchange rates of EU countries vis-à-vis the D-mark based upon end-of-period spot exchange rates vis-à-vis the US dollar (monthly series). Source: IMF *International Financial Statistics*, line ae.

II. The Independent Variables

1. Description and Source of Indicators

Indicator	Description	Source
CA	Current account balance as percentage of GDP	OECD, <i>National Accounts</i> . Main Aggregates, Volume I, 1960–1993
CRED	Total domestic credit to the economy as percentage of GDP	IMF, <i>IFS Yearbook 1994</i> , line 32
DEBT	General government gross debt as percentage of GDP	OECD <i>Economic Outlook</i> , No. 55
EXR	Variable indicating exchange rate flexibility; 2 for minimal flexibility, 1 for intermediate flexibility and 0 for maximal flexibility	IMF, <i>Exchange Restrictions, Annual Report</i> , 1974–1978. IMF, <i>Exchange Arrangements and Exchange Restrictions, Annual Report</i> , 1979–1993
ES	Eijffinger-Schaling index of central bank independence (ranges from 1 for minimal independence to 5 for maximal independence)	Eijffinger and Schaling (1993), Eijffinger and Van Keulen (1995)
DEF	General government financial balance (government net lending) as percentage of GDP	OECD <i>Economic Outlook</i> , No. 55
GCF	Gross fixed capital formation as percentage of GDP	IMF, <i>IFS Yearbook 1994</i> , line 93e
GDP	Gross domestic product	OECD, <i>National Accounts</i> . Main Aggregates, Volume I, 1960–1993
M1	Money as percentage of GDP	IMF, <i>IFS Yearbook 1994</i> , line 34
M2	Money plus quasi-money as percentage of GDP	IMF, <i>IFS Yearbook 1994</i> , lines 34 (money) and 35 (quasi-money)
M2M1	Money plus quasi-money over money	IMF, <i>IFS Yearbook 1994</i> , lines 34 (money) and 35 (quasi-money)
INF	Rate of change in the consumer price index (1990 = 100)	IMF, <i>International Financial Statistics</i> , line 64
LEFT	Dummy variable, taking the value 1 when a left-wing government is in place and the value 0 otherwise	Banks (1993)
OPEN	Openness of the economy = export of goods and services + imports of goods and services over GDP	OECD, <i>National Accounts</i> . Main Aggregates, Volume I, 1960–1993
PROD	Index of productivity in the business sector (1987 = 100)	OECD <i>Economic Outlook</i> , No. 55
SIGGOV	Total number of significant government changes, measure for political instability	De Haan and Van 'tHag (1995)
UN	Unemployment rate	OECD <i>Economic Outlook</i> , No. 55

2. Exchange Rate Arrangements (EXR): Minimal Flexibility (2) Intermediate Flexibility (1) and Maximal Flexibility (0)

	AUS	BEL	DEN	FIN	FRA	GER	ITA	NET	SPA	SWE	UK	TOTAL
1974	1	2	2	1	0	2	0	2	2	2	0	14
1975	1	2	2	1	0	2	0	2	1	2	0	13
1976	1	2	2	1	2	2	0	2	1	2	0	15
1977	1	2	2	1	0	2	0	2	1	2	0	13
1978	1	2	2	1	2	2	0	2	1	1	0	14
1979	1	2	2	1	2	2	2	2	0	1	0	15
1980	1	2	2	1	2	2	2	2	0	1	0	15
1981	1	2	2	1	2	2	2	2	0	1	0	15
1982	1	2	2	1	2	2	2	2	0	1	0	15
1983	1	2	2	1	2	2	2	2	0	1	0	15
1984	1	2	2	1	2	2	2	2	0	1	0	15
1985	1	2	2	1	2	2	2	2	0	1	0	15
1986	1	2	2	1	2	2	2	2	0	1	0	15
1987	1	2	2	1	2	2	2	2	0	1	0	15
1988	1	2	2	1	2	2	2	2	0	1	0	15
1989	1	2	2	1	2	2	2	2	0	1	0	15
1990	1	2	2	1	2	2	2	2	1	1	0	16
1991	1	2	2	1	2	2	2	2	1	1	2	18
1992	1	2	2	1	2	2	2	2	1	1	2	18
1993	1	2	2	0	2	2	0	2	1	0	0	12
TOTAL	20	40	40	19	34	40	28	40	10	23	4	

Source: Index constructed with the help of IMF, *Exchange Restrictions, Annual Report*, 1974–1978 and IMF, *Exchange Arrangements and Exchange Restrictions, Annual Report*, 1979–1993.

3. Political Leaning of the Government (LEFT): Left-Wing Government (1), Right-Wing Government (0)

	AUS	BEL	DEN	FIN	FRA	GER	ITA	NET	SPA	SWE	UK	TOTAL
1974	1	0	1	1	0	1	1	1	0	1	1	8
1975	1	0	1	1	0	1	0	1	0	1	1	7
1976	1	0	1	1	0	1	0	1	0	1	1	7
1977	1	0	1	1	0	1	0	1	0	0	1	6
1978	1	0	1	1	0	1	0	0	0	0	1	5
1979	1	0	1	1	0	1	1	0	0	0	1	6
1980	1	1	1	1	0	1	1	0	0	0	0	6
1981	1	1	1	1	1	1	0	1	0	0	0	7
1982	1	0	1	1	1	1	0	1	1	1	0	8
1983	1	0	0	1	1	0	1	0	1	1	0	6
1984	1	0	0	1	1	0	1	0	1	1	0	6
1985	1	0	0	1	1	0	1	0	1	1	0	6
1986	1	0	0	1	1	0	1	0	1	1	0	6
1987	1	0	0	1	0	0	1	0	1	1	0	5
1988	1	1	0	0	1	0	0	0	1	1	0	5
1989	1	1	0	0	1	0	0	1	1	1	0	6
1990	1	1	0	0	1	0	0	1	1	1	0	6
1991	1	1	0	0	1	0	0	1	1	1	0	6
1992	1	1	0	0	1	0	0	1	1	1	0	6
1993	1	1	0	0	1	0	0	1	1	1	0	6
TOTAL	20	8	9	14	12	9	8	11	12	15	6	

Source: Dummy variable constructed with the help of Banks (1993).

4. Eijffinger-Schaling Index of Central Bank Independence (ES) and De Haan-Van 'tHag Index of Significant Government Changes (SIGGOV)

	AUS	BEL	DEN	FIN	FRA	GER	ITA	NET	SPA	SWE	UK
<i>ES</i>	3	3	4	3	2	5	2	4	1	2	2
<i>SIGGOV</i>	2	4	1	3	4	1	6	3	1	2	0

Source: Eijffinger and Schaling (1993); Eijffinger and Van Keulen (1995); De Haan and Van 'tHag (1995).

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Abstract: The Fundamental Determinants of Financial Integration in the European Union. – This paper focuses on the fundamental determinants of the degree of financial integration in the European Union over the period 1974–1993. Using closed interest rate differentials to measure the intensity of capital controls and applying a pooled cross-section time-series approach, the authors find realized inflation, government instability and gross fixed capital formation to have a strong and significantly positive effect on the intensity of capital export controls. In addition, they expect the influence of economic and financial market structure on closed interest rate differentials to increase in the future. JEL no. E43, F32, F36

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Zusammenfassung: Fundamentale Bestimmungsgründe für die finanzielle Integration in der Europäischen Union. – Die Verfasser behandeln die entscheidenden Bestimmungsgründe für das Ausmaß der finanziellen Integration in der Europäischen Union während der Zeit 1974–1993. Sie benutzen die Zinsdifferenzen, die sich für Papiere gleicher Währung zwischen Offshore- und Onshore-Märkten ergeben, um die Stärke der Kapitalkontrollen zu messen, und arbeiten mit einem kombinierten Querschnitts- und Zeitreihenansatz. Sie stellen fest, daß die tatsächliche Inflationsrate, politische Stabilität und Bruttokapitalbildung einen starken und signifikant positiven Einfluß auf das Ausmaß der Kapitalexportkontrollen haben. Außerdem erwarten sie, daß der Einfluß der wirtschaftlichen und finanziellen Marktstrukturen auf die Zinsdifferenzen in Zukunft zunehmen wird.