

European Economic Integration and Swiss Foreign Direct Investment

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In the last few years, economic integration has proceeded all over Europe but Switzerland has chosen to stay outside. As a result, concern is growing as to the economic effects of Switzerland's increasing isolation. In particular, people fear what is known as «delocalization», which means a shift of production activities from Switzerland to other countries and the corresponding job destruction in Switzerland. In the balance of payments statistics, delocalization is captured by the evolution of Swiss foreign direct investment (FDI) both inwards and outwards. Recent data published by the Swiss National Bank (SNB) show that foreign firms have indeed reduced their direct investments in Switzerland but that Swiss FDI in the EU has decreased from 4.1 billions in 1992 to 1.9 billions in 1993. This evidence contradicts the common view according to which integration increases the locational advantages of member countries and thus induces an increase of the FDI inflows from third countries. The purpose of this paper is to contribute to a better understanding of this problem by investigating the determinants of Swiss outward FDI.

Our main contribution is to provide econometric estimates of the determinants of Swiss FDI. To our knowledge, such estimates have not been published yet because until 1994, the necessary data were difficult to collect. On the one hand, the SNB statistics of Swiss FDI disaggregated by recipient country or by industries were not available. On the other hand, statistics published by destination countries were not available in a consistent framework before 1993, when the first yearbook of FDI statistics was published by the OECD. This yearbook provides information on inward and outward FDI by country for all OECD countries. In this study, destination country statistics are pooled into a panel of FDI flows from Switzerland towards 12 countries for 11 years.

The paper begins with a short discussion of two distinct approaches of the link between integration and FDI. It is followed by a review of empirical work in this area which motivates our empirical approach. Next comes the presentation of our empirical model. Results, which are discussed in the last part, confirm expectations about the positive correlation between Swiss FDI and recipient countries' market size and return on capital, and about the negative correlation with recipient country wages. The negative effects on Swiss FDI of higher Swiss exports and a higher value of the Swiss Franc are less straightforward.

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THE IMPACT OF REGIONAL INTEGRATION ON FDI BY NON-MEMBERS

Theoretical results

As a number of authors note, there have been few attempts to integrate the theory of FDI into regional integration theory¹. DUNNING and ROBSON (1987) put forward two reasons for this neglect. On the one hand, integration theory, like international trade theory from which it derives is not concerned with the ownership aspect of capital flows. On the other hand, recent analyses of FDI and the trans-national enterprise rely on market failures that are not easily incorporated in traditional trade theory. More generally, the lack of an appropriate model integrating FDI theory and customs union theory should be related to the peculiar evolution of economic theory in both the concerned fields. In a recent survey, HARRIS (1994) notes that «the general field of customs unions theory has undergone remarkably little in the way of change in the subsequent 34 years since LIPSEY's (1957) survey». According to him, the reason for this lack of evolution is that «the number 3 is an absolute barrier to generality». Although for different reasons, the evolution of FDI theory is impaired by a similar generalization problem. The multiple models which constitute the theory all focus on a different aspect of FDI which is heterogeneous by nature. The following discussion illustrates the two extreme approaches which can be found in the literature.

Hypotheses about the impact of customs unions on FDI have been drawn by extending the neoclassical theory of international trade to situations involving factor mobility. In this perspective, the Stolper Samuelson theorem can be used to conclude that the adoption of a common external tariff will raise the real remuneration of the factor in which the imported good is relatively more intensive. Assuming that EC imports are capital intensive, this leads to the expectation that profit rates will increase in the EC and thus induce flows of FDI by non-members.

This approach has the advantages and drawbacks associated with the type of models used in «orthodox» trade theory. It relies on a set of well-known assumptions and provides a relatively simple expectation of what might happen in the long term. On the other hand the restrictive aspect of some of its assumptions and its highly abstract nature have given way to various criticisms. First, FDI is not distinguished from other capital flows although its behavior is obviously different from the behavior of portfolio investments. Second, trade and investment appear as substitute ways of supplying the same market although it has been demonstrated that substitutability between trade in goods and trade in factors is a rather special result which is generally true only under restrictive assumptions. Third, the formation of a customs union sums up to raising outward protection. Effects induced by reductions of trade barriers inside the bloc are not explicitly taken into account although they might outweigh external tariff effects even from the point of view of third countries.

1. Cf. DUNNING and ROBSON (1987) or ROBSON and WOOTON (1993).

In an attempt to provide a framework for linking the theory of economic integration with the theory of FDI which doesn't suffer from these drawbacks, DUNNING and SAUVANT (1993) suggest a different approach. Their idea is to link each of the effects of economic integration schemes with the likely strategic responses of firms engaged in international production. The theory of economic integration brings out five main effects of discriminatory trading arrangements. These effects will generate strategic responses by trans-national corporations which translate in changes in the level of FDI. The five effects and their likely impact on FDI are the following. Trade diversion induces defensive import-substituting investments which will be located in the member state which becomes the replacement source. Trade suppression induces the same type of FDI but it will be located in the member state which experiences a shift of its import supplies. Trade creation effects will induce changes in the configuration of locational advantages among members. These changes may not induce a net increase in FDI inside the customs union but may lead to a re-grouping of production units in fewer locations. Cost reductions and efficiency gains may induce increased FDI if trans-national corporations increase sourcing in the region. Finally, market expansion, demand growth, and technical progress may induce offensive import substitution investments.

The following points are worth noting. First, DUNNING and SAUVANT's results do not depend on any a priori view about the substitutability or complementarity of trade and FDI. Defensive import substituting FDI's are essentially trade-replacing but FDI generated by changes in locational advantages and cost reductions may well be associated with increases in trade. Second, the reduction of trade barriers inside an integrated bloc affects the location of production through both direct and indirect effects, the latter brought about through changes in income or competition. Third, DUNNING and SAUVANT's approach shows that the aggregate result, although generally positive will depend on the relative strength of each of the five effects. Finally, turning to factor market integration effects on direct investment by third countries, it is likely that the main impact will be channeled through cost reductions and efficiency gains. This approach then suggests that locational advantages of the integrating countries will increase so that FDI by non-members can again be expected to grow.

In our view, the foregoing shows how attempts at providing comprehensive frameworks in this particular field are polarized between on the one hand abstract models which do not take into account important characteristics of FDI and on the other hand approaches which capture much more characteristics but do not supply straightforward answers.

Existing empirical results

Until the mid-eighties, empirical work on the effect of European economic integration on FDI by non-members has generally taken the form of studies of the determinants of

US FDI in the EEC². The first stage of the customs union of the EC coincided with a considerable inflow of FDI into the EC, especially from the United States. Between 1957 and 1964, the value of US FDI in the EC trebled. Having shown that the locational pattern of US FDI abroad changed significantly in the years following the formation of the EC, researchers attempted to establish a link between this deflection and the process of European integration. To do this, early studies regressed time series of measures of US FDI in the EC on various determinants of FDI. Estimated investment demand equations included a tariff discrimination proxy among the determinants. The discussion then focused on the results pertaining to the tariff discrimination variable and in particular on the choice of the proxy variable³. SCAPERLANDA and BALOUGH (1983) provided the strongest empirical support so far available for the hypothesis that the formation of the EC and the process of economic integration had a definite influence on the locational patterns of United States FDI abroad during the 1960s.

The approach followed in these earlier studies was seriously questioned. As data about intra-EC FDI became available, various studies showed that EC integration had stimulated intra-EC FDI. MOLLE and MORSINK (1989) for example found that above a certain level of trade intra-EC trade and intra-EC investment are in fact complementary flows. Such results were seen as contradictory to those concerning US FDI. The differences in the conclusions which could be drawn from the two groups of studies have been attributed to various reasons. The time span covered by the data series was too short, the proxies were unadapted, and the availability of data forced researchers to concentrate on US FDI. But some analysts consider that the most important problem with these studies is that the model on which they rely does not properly describe the interrelations between integration and FDI. In their opinion, the reviewed studies rely on the neoclassical model which we first discussed in the preceding section rather than on an integrated framework in which international production theory and imperfect competition theory play an important role.

As we see it, the problem is one of interpretation. The surveyed studies are in fact studies of the determinants of US FDI in the EEC. Even if in the particular case of US FDI during the first phase of the EC, it might have been justified to focus on the tariff-jumping motivation, their interpretation should not be limited to a discussion of the coefficient attached to the tariff discrimination variable. As we have seen, integration's effects on FDI are both direct and indirect. In this perspective, an analysis of the determinants of FDI provides very interesting information as to the direct as well as indirect effects of integration.

2. See YANNOPOULOS (1990) for a survey.
3. On the one hand, proxies relying on trade data were criticized because they are affected by the degree of substitutability between FDI and trade flows. On the other hand, the dummy scheme used by SCAPERLANDA and BALOUGH (1983) to represent the progressive dismantlement of industrial tariffs on intra-EEC trade was criticized because it captured a combination of the effect of the fall of the EC external tariff and of the relative movements of extra- and intra-EC tariffs.

The more recent work in this field, which attempts to take into account the new developments in the theory of FDI, follows one of two different approaches. First, researchers like DUNNING and SAUVANT (1993) or BALASUBRAMANYAM and GREENAWAY (1992) use a framework, of the type described in the preceding section, which distinguishes between various channels through which integration affects FDI. However, their empirical work is limited to an examination of disaggregated FDI statistics. Proper empirical tests of hypotheses drawn using their approach would require disaggregated data which are not available for most countries.

Second, some authors tread on the way paved by the early studies of the determinants of US FDI in the EC. CULEM (1988) essentially enlarges the scope of study to bilateral FDIs among industrialized countries and puts forward alternative specifications of their locational determinants. His results do not provide any direct evidence about the effect of integration. However, they contribute to a better understanding of the determinants of FDI and shed some light on the mechanisms through which integration might affect FDI. In a similar study of German FDI, MOORE (1993) obtains little evidence that host-country tariff rates affect German FDI.

HEITGER and STEHN (1990) estimate the elasticity of Japanese FDI in the EC to inter industry differences in the rate of effective protection. Their results support the hypothesis that European effective protection and favorable firm-specific non-tangible assets of Japanese firms determine the structure of Japanese FDI in Europe. However, NICOLAIDES and THOMSEN (1991) rightly point out that HEITGER and STEHN do not examine any alternative explanations so that the validity of their characterization of protectionism as the most important determinant can be questioned.

Our empirical work is in the line of CULEM (1988). On the one hand, the scarcity of available data on Swiss FDI severely limits the range of possible empirical work. On the other hand, considering the lack of econometric estimates of the determinants of Swiss FDI, any attempt at filling this gap appears as a sensible (first) step in the process of understanding the reactions of Swiss FDI to European integration.

THE DETERMINANTS OF SWISS FDI IN THE EU

The model

In order to get some insight in the effects of EU integration on Swiss FDI, one would wish to dispose of FDI series stretching over periods of changes like those following the 1972 free-trade agreement, the 1992 single market or the recent creation of the EEA. Unfortunately such data are not available. As already mentioned, although the SNB collects data on FDI since 1985, disaggregations by countries or sectors were published for the first time in 1994 for the year 1993. We thus turned to data collected by recipient countries and published by the OECD.

The sample pools data pertaining to twelve OECD countries including six EU countries over eleven years (1982–1992). FDI flows originating in Switzerland are available for Denmark (DK), France (F), Germany (G), the Netherlands (NL), Spain (SP), the United Kingdom (UK), Australia (AUS), Austria (O), the United States (US), Finland (SF), Japan (J) and Sweden (S)⁴. Data are far from being homogeneous. We discuss problems of comparability inside the sample in the Appendix.

The data set is used to study the determinants of Swiss outward FDI. Although the sample is not particularly appropriated to the analysis of the effects of European integration, we focus on the determinants of FDI towards EU countries.

The dependent variable is the net flow of FDI expressed in 1990 Swiss Francs⁵. FDI flows are funds used to acquire partial or total control of local enterprises (through take-over or green field investment) or to finance current activities of existing affiliates. They can be equity or debt and contribute to finance fixed assets or working capital. Net flows are gross investments minus disinvestments and loan repayments.

Like in most empirical studies of EU integration and FDI, the model underlying our choice of exogenous variables is of the demand pull type. BAJO-RUBIO and SOSVILLA-RIVERO (1994) present a simple theoretical model of investment expenditures by an MNE. FDI is shown to depend positively on the level of aggregate demand and negatively on the relative unit costs through their effects on the desired stock of capital for foreign production. It is also shown to depend positively on the lagged value of the foreign capital stock. However, as can be seen in the surveys by AGARWAL (1980), LIZONDO (1991) or RAYOME and BAKER (1995), there are many hypotheses about the determinants of FDI but a generally accepted theory is lacking. A tight structural specification could thus not be derived. Because this study represents one of the first attempts to estimate econometrically the determinants of Swiss FDI, a wide range of independent variables have been included⁶. Our results are therefore to be considered as paving the way for future research on specific factors.

Our model includes real GNP ($y_{i,t}$) and the annual percent growth rate of real GNP ($\delta y_{i,t}$) of the recipient countries as explanatory variables. As a proxy of lagged sales of foreign affiliates, GNP should be positively correlated to extension FDI and as a proxy of market size, it should positively influence new investments⁷. As for the growth rate of the GNP, it should capture the acceleration principle. Existing empirical evidence supports the market size hypothesis. There is far less support for the link between host country growth and FDI.

Our model also includes the real wage ($w_{i,t}$) and the real interest rate ($r_{i,t}$) in the recipient country. The real interest rate stands as a proxy for the real expected return on investments. The idea that FDI flows out of countries with low returns to those with

4. The choice of countries and years is restricted by the availability of data. FDI flows are available over the period 1982–1992 for 14 countries but data on wages were not available for Portugal and Turkey.
5. Regressions run using undeflated data yielded qualitatively identical results to those reported below.
6. Detailed definitions of the constructed variables and data sources are included in the Appendix.
7. For a discussion of the role of output and market size, see AGARWAL (1980).

higher returns per unit of capital has been very popular in the fifties. However, attempts to test this hypothesis or the portfolio hypothesis failed to provide conclusive results. Lower real wages represent a locational advantage only insofar as they are not compensated by a lower productivity. Unfortunately, appropriate data were unavailable for our sample.

As we have already mentioned, most empirical studies concerned with the relation between integration and FDI include a tariff discrimination proxy among their regressors. We didn't include any such variable in our estimated model for various reasons. First, since the level of tariff barriers on manufactured products has been reduced through the various GATT rounds, the importance of non-tariff barriers has increased⁸. Second, tariff as well as non-tariff barriers are concentrated in agriculture and a few other sectors (textiles) so that aggregate measures might be misleading. Moreover, our sample stretches over a period which is not characterized by important changes in the level of protection. In our opinion, differential protection's impact should therefore be investigated at the sectoral level⁹.

In our specification, the effects of EFTA and of the free-trade agreement with the EU which existed before 1982 are captured mainly by two variables. First, following CULEM (1988), we introduced lagged real Swiss exports towards recipient countries ($\chi_{i,t-1}$). A negative sign of this effect might be interpreted as evidence that trade and FDI are substitutable. This in turn would suggest the presence of a tariff-jumping motivation for FDI. Second, we have introduced a dummy variable for EU countries ($deu_{i,t}$). However, the interpretation of the sign of the corresponding coefficient is difficult. The expected sign is negative if one believes that FDI is mainly used to circumvent tariff barriers.

Considering the recent public debate on delocalization from Switzerland related to the appreciation of the Swiss Franc, we have explored the possible influence of the exchange rate by introducing the Purchasing Power Parities for GDP published by the OECD ($ppp_{i,t}$). GDP PPPs are the rates of currency conversion which eliminate differences in price levels between countries. They are expressed in Swiss Francs per unit of national currency. Recently, various authors have formulated models explaining the striking negative correlation between inward FDI in the United States and the value of the dollar¹⁰. The idea that an appreciation of the domestic currency exerts a positive effect on the flow of outward FDI is well installed today. However, as STEVENS (1977) has shown, one can make a plausible theoretical case for any outcome and the ball would seem to be in the court of empiricists.

8. Using a survey of UK direct investors, MILLINGTON and BAYLISS (1991) show that institutional and legal barriers are one of the principal determinants of FDI location in the EU. Data concerning non-tariff barriers are still unsatisfying. The UNCTAD data base for example does not take into account important barriers like restricted access to public procurement or different technical standards and certification procedures.
9. See NEVEN and SIOTIS (1995) for an empirical study at the sectoral level.
10. See FROOT and STEIN (1991) for a discussion of theoretical models and KLEIN and ROSENGREN (1994) for empirical testing of the models.

Finally, our set of regressors includes the sum of Swiss FDI flows towards 14 OECD countries ($fditot_t$). This variable plays a role similar to the role of a time dummy¹¹.

Our model doesn't incorporate characteristics of the Swiss Economy as explanatory variables. This means that we accept the assumption that the choice of an optimal foreign location is subsequent to a locational choice between domestic and foreign investment. In other words, we assume that domestic and foreign investment are not part of a unique and integrated decision process. Empirical evidence supporting this assumption is provided by CULEM (1988).

Empirical results

Our estimated model can be written in the following general form:

$$fdi_{it} = \alpha_0 + \alpha_1 y_{i,t} + \alpha_2 \delta y_{i,t} + \alpha_3 w_{i,t} + \alpha_4 r_{i,t} \\ + \alpha_5 \chi_{i,t-1} + \alpha_6 ppp_{i,t} + \alpha_7 deu_{i,t} + \alpha_8 fditot_t + \varepsilon_{i,t}$$

Data are pooled in order to make full use of the available information and various estimation methods (OLS, fixed effect model, random effects model) are compared¹². We first present the results obtained with the complete sample of 12 OECD countries. Table 1 shows both plain OLS and random effects estimates. Plain OLS was preferred to the model including country dummy variables because the hypothesis of a same intercept for all countries could not be rejected at the 1% significance level¹³. Suspecting the presence of heteroskedasticity, we used White's estimator for the variance of the least squares estimator. Results obtained using an error components model are also shown although they do not differ significantly from those obtained with OLS. The error components model was preferred to the covariance model because the hypothesis that the individual effects are uncorrelated with the endogenous variable could not be rejected¹⁴.

11. Results obtained using countries' shares of total FDI as the dependant variable do not differ qualitatively from those presented.
12. The seemingly unrelated regression model is not appropriated when the number of equations is superior to the number of observations per cross-section unit. Moreover, OLS estimates of individual equations do not reveal any systematic pattern in the intercepts or slopes, or correlation across cross-section units.
13. The F statistic is 1.0715.
14. The W statistic for the Hausman test which has an asymptotic $\chi^2(7)$ distribution equals 8.904.

Table 1: Determinants of Swiss FDI flows towards 12 OECD countries 1982–1992

	<i>fdi</i> _{<i>i,t</i>}			
	OLS		Error components	
α_0	332.2	(0.85)	323.0	(0.53)
$y_{i,t}$	0.390	(3.55)	0.390	(6.45)
$\delta y_{i,t}$	-52.52	(-1.25)	-51.16	(-1.15)
$w_{i,t}$	-82.34	(-5.26)	-82.16	(-2.67)
$r_{i,t}$	60.04	(2.45)	61.19	(1.47)
$x_{i,t-1}$	-0.075	(-4.04)	-0.076	(-2.65)
$ppp_{i,t}$	305.6	(2.41)	305.6	(3.25)
$deu_{i,t}$	384.6	(3.11)	380.9	(1.65)
$fditot_t$	0.088	(2.49)	0.088	(4.51)
\bar{R}^2	0.456		0.405	

t statistics in parentheses, OLS standard errors are heteroskedastic consistent.

As can be seen from the OLS estimates, all included variables except the output growth rate exert a significant impact on Swiss FDI. Note that without correction for heteroskedasticity, $r_{i,t}$ as well as $deu_{i,t}$ become non-significant as they are with the error component model.

As in most similar studies, our results show that a larger market is more attractive to foreign investors. However, the coefficient of the output growth rate is not significant.

As expected, *ceteris paribus* investors prefer to invest in countries where wages are lower. However, comparing the results of regressions run separately on the subsamples of EU and non-EU countries (Table 2) shows that for EU countries, there is a non-significant relation between real wages and real FDI. Our results also show that a higher real interest rate attracts Swiss foreign investors. As Table 2 shows, this result appears to be robust when the sample is restricted to EU countries only. Considering that previous studies failed to provide empirical evidence supporting the hypothesis that FDI is a function of international differences in rates of return on capital investment, our result should be considered cautiously¹⁵.

The negative correlation between prior exports and FDI is a bit surprising. It can be interpreted as supporting evidence for a substitutability relationship between trade flows and foreign investment flows. In his study of the determinants of bilateral FDI flows between industrial countries, CULEM (1988) estimates a significant positive effect for the complete sample and for all subsamples except the one including only intra-EU flows which exhibits a negative effect. He explains this peculiarity of intra-EU FDI by the geographic proximity and economic similarity of EU partners and by the non-existence

15. Replacing both factor prices by the ratio of factor prices did not change the results significantly. However, the coefficient of the ratio himself was not significant.

of protectionist threats. First, EU partners are able to monitor third markets from their national headquarters so that they do not need to serve foreign markets by exports prior to undertake local production. Second, defensive FDI is not warranted when retaliation is impossible. Both arguments may apply to Swiss investments in EU countries¹⁶ but not to Swiss FDI towards the United States, Japan or Australia. Comparing the results obtained in running our regression for the subsample of EU countries and for the subsample of non-EU countries we got some support for CULEM's explanations. Although non-significant, the coefficient on lagged exports is negative with the EU subsample and positive with the non-EU subsample.

The positive coefficient of the EU dummy variable indicates that EU member countries are a preferred destination for Swiss FDI¹⁷. One might have expected that, controlling for other effects, tariff-jumping investments should be lower towards the EU than towards the United States, Japan or Australia. According to this view, the positive sign of the EU dummy coefficient contradicts the tariff jumping argument. In order to get more insight on this particular point, it is interesting to focus on the case of Spain who joined the EU during our sample period. Although non-significant, the negative sign of the EU dummy variable which we estimated on the subsample of EU countries contradicts the result obtained with the complete sample.

Turning to the exchange rate, our results point to a negative relationship between the real value of the Swiss Franc and Swiss FDI flows. Furthermore, this relationship appears to be very robust. Regressions run using the real exchange rate or the exchange rate growth rate instead of the PPPs as well as regressions run using undeflated data yielded the same result¹⁸. This contradicts current opinions. However, as we already noted, STEVENS (1974) has demonstrated that there is a plausible theoretical case for any outcome. In particular, if foreign subsidiaries use inputs imported from Switzerland, an appreciation of the Swiss Franc should induce a reduction of foreign production and foreign investment. KLEIN and ROSENGREN (1994) mention another possible source for such a relationship. If FDI represents tariff-jumping and if the threat of protectionism rises with a stronger currency, a depreciation of the Swiss currency might induce an increase of FDI flows towards the countries experiencing an appreciation of their currency¹⁹.

Finally, our results show that FDI flows to individual countries are positively and significantly correlated with the sum of the twelve flows.

16. The second argument seems less relevant than the first. Even though Swiss exporters should not fear an increase of EU tariffs, they might fear increases in non-tariff barriers.
17. Running the same regression with the dummy variable for members of the EU and the EFTA, we got very similar results.
18. We also checked the sensitivity of our results to our definitions of real GNP and wages by replacing the series calculated as indicated in the Appendix by series where foreign GNPs and wages are converted in Swiss Francs with current exchange rates prior to be deflated with the Swiss GDP deflator. However, even this change left the result largely unaltered.
19. Note that FROOT and STEIN (1991) appeal to the tariff-jumping argument to explain the inverse relationship between exchange rates and FDI flows. If trade deficits tend to precede currency depreciations, the FDI increase may coincidentally happen at about the same time that the currency falls in value.

Most results obtained with the subsamples of EU and non-EU countries separately (see Table 2) have already been discussed above. However, the following comments might be added. First, although many coefficients are non-significant, results differ qualitatively only for previous exports. Second, as we already mentioned, the relation between exchange rate and FDI is the most robust. Third, surprisingly market size does not seem to exert a significant impact on FDI in the EU. Note however that CULEM (1988) found and discussed a similar result when studying US FDI in the EC. Fourth, OLS and error components estimates do not point to the same determinants as exerting a significant role. The coefficients of the interest rate are significant with OLS but not with error components and inversely for total FDI.

Table 2: Determinants of Swiss FDI flows towards 6 EU and 6 Non-EU countries 1982–1992

	$fdi_{i,t}$			
	subsample of EU countries		subsample of non-EU countries	
	OLS	Error components	OLS	Error components
α_0	-217.4 (-0.22)	-646.3 (-0.55)	-55.0 (-0.06)	-53.52 (-0.03)
$y_{i,t}$	0.826 (1.07)	1.250 (1.30)	0.173 (2.00)	0.173 (1.30)
$\delta y_{i,t}$	-29.85 (-0.30)	-24.64 (-0.35)	-54.38 (-1.16)	-54.29 (-0.87)
$w_{i,t}$	-46.30 (-0.90)	-18.95 (-0.27)	-80.26 (-1.42)	-80.31 (-0.91)
$r_{i,t}$	123.3 (2.15)	128.0 (1.89)	56.71 (1.95)	56.66 (0.92)
$ppp_{i,t}$	325.1 (2.08)	307.3 (2.61)	303.3 (2.87)	303.3 (1.13)
$x_{i,t-1}$	-0.127 (-1.43)	-0.173 (-1.60)	0.239 (2.01)	0.238 (1.46)
$due_{i,t}$	-127.0 (-0.30)	-289.5 (-0.50)		
$fditot_t$	0.085 (1.83)	0.084 (3.55)	0.089 (1.53)	0.089 (2.83)
\bar{R}^2	0.377	0.328	0.497	0.450
F^*		1.730		1.006
W^{**}		7.752		5.020

t statistics in parentheses. OLS standard errors are heteroskedastic consistent.

* F-statistic of the test for the hypothesis of a same intercept for all countries.

** W-statistic of the Hausman test for the hypothesis of orthogonality between individual effects and the regressors.

CONCLUSIVE REMARKS

Our conclusive remarks will focus on our results' contribution to a better understanding of European integration's effects on Swiss FDI.

Consider first the direct measure of EU membership's effect provided by the coefficient associated to the dummy variable. The positive sign obtained when using the complete sample indicates that *ceteris paribus* European countries are a preferred destination for Swiss investors. However, interpreting this result is a difficult task because we do not know which effects are captured by the dummy variable. EU countries differ from other countries included in our sample in various respects. They are tied to Switzerland by a free-trade agreement. But, as we already mentioned, the EU dummy does not seem to capture this effect. Another characteristic which EU countries do not share with most non-EU countries is their geographic and cultural proximity to Switzerland. But this characteristic is again at least partially captured by the exports variable. Thus ignoring what exactly is hidden behind the EU dummy, we cannot infer anything as to integration's effect.

Turning to lagged exports' effect, we have already mentioned that the negative sign of the coefficient can be interpreted as a support for the substitutability hypothesis. According to this view, any increase in the difficulties encountered by Swiss firms exporting to the EU might clearly increase Swiss FDI in the EU.

The foregoing focused on measures of the most direct effects of integration. However, European integration might also affect Swiss FDI through indirect channels. Efficiency gains and cost reductions induced by increased competition in the single market or the EEA might increase EU countries' market size and growth. However, our results suggest that Swiss FDI in the EU might not be strongly affected by changes in market size and even less by changes in growth.

Evidence so far supports the idea that Swiss FDI in the EU will increase mainly if integration augments discrimination against Swiss exports. However, this conclusion should be completed by the following remarks. First, considering our results, the strong decrease of Swiss FDI in the EU observed in 1993 is rather surprising. On the one hand, it might be partially explained by the Swiss Franc's appreciation with regard to most European currencies. On the other hand it suggests that important factors might not have been taken into account. The central question is which changes brought by EU integration will affect Switzerland's FDI. Economic integration exerts its impact on FDI by third countries through various channels which depend among others on the content of the integration agreement. The impact of non-tariff barriers should clearly be analyzed in future research²⁰. Second, the assumption that firms' decisions as to domestic investment and FDI are independent appears to play a central role. In particular if one is interested in delocalization effects. Future research should also focus on this point. Third, improvements in the quantity and quality of available FDI data will certainly allow significant

20. Other factors, like for example tax policy might also play a role.

improvement in our understanding of the determinants of Swiss FDI. Data disaggregated at the sectoral level might for example be used to analyze the role of imperfect competition. Our study of aggregate flows represents a first attempt at econometrically estimating the determinants of Swiss FDI. Much work clearly remains.

APPENDIX

Data definitions and sources

- $fdi_{i,t}$ Annual flow of FDI from Switzerland to country i converted in Francs using annual average exchange rates and divided by the Swiss GDP deflator (1990=100). Expressed in millions of 1990 Swiss Francs.
Sources: FDI flows, OECD International Direct Investment Statistics Yearbook; Exchange rates and GDP deflators, IMF International Financial Statistics
- $y_{i,t}$ GNP of recipient country i divided by GDP deflator of country i , converted in Swiss Francs with the 1990 exchange rate, and lagged one period. Expressed in billions of 1990 Swiss Francs.
Source: IMF International Financial Statistics.
- $\delta y_{i,t}$ Real GNP of recipient country i growth rate in percent.
- $w_{i,t}$ Hourly gain per hour in non-agricultural activities (or manufacturing activities) in country i deflated with the consumer price index (1990=100) of country i , and converted in Swiss Francs with the 1990 exchange rate. Expressed in 1990 Swiss Francs.
Source: for the hourly gains, ILO Yearbook of Labor Statistics; for the CPI, IMF International Financial Statistics.
- $r_{i,t}$ Market interest rate minus inflation rate of country i .
Source: IMF International Financial Statistics.
- $x_{i,t-1}$ Swiss exports to recipient country i expressed in Swiss Francs, divided by the Swiss exports deflator (1990=100), and lagged one year. Expressed in millions of 1990 Swiss Francs.
Source: Swiss Statistics Yearbook.
- $PPP_{i,t}$ Purchasing power parities for GDP expressed in Francs per unit of national currency.
Source: OECD National Accounts. Main aggregates, Vol. 1. 1960–1993.
- $fditot_t = \sum_{i \in S} fdi_{i,t}$ and S is the set of countries including the 12 countries included in our sample plus Portugal and Turkey.

OECD FDI data are those reported by the recipient countries. There are limitations in data comparability due to differences in FDI definitions. The threshold levels of control of foreign enterprises which are required in order to assimilate outward financial flows

to FDI differ among countries. The country classification of statistics on FDI are based on different criteria. Reinvested earnings are not included in data for Denmark, France, Japan and Spain.

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SUMMARY

This paper provides econometric estimates of the determinants of Swiss outward FDI. Destination country statistics are pooled into a panel of FDI flows from Switzerland towards 12 OECD countries for 11 years (1982–1992). Results confirm expectations about the positive correlation between Swiss FDI and recipient countries' market size, and about the negative correlation with recipient countries' wages. However, Swiss FDI towards EU countries appears to be more sensitive to exchange rate variations.

ZUSAMMENFASSUNG

Dieser Beitrag stellt Schätzungen eines ökonomischen Modells der Bestimmungsfaktoren schweizerischer Direktinvestitionen im Ausland vor. Die Daten für Direktinvestitionen stammen aus den Empfangsländern. Aus den Zeitreihen (1982–1992 jährlich) für 12 OECD-Länder wird ein Panel gebildet. Ergebnisse bestätigen, dass die Grösse des Empfangslandmarktes den Fluss schweizerischer Direktinvestitionen positiv beeinflusst. Sie zeigen auch, dass eine negative Beziehung zwischen Direktinvestitionen und Löhnen im Empfangsland besteht. Zudem lassen die Schätzungen vermuten, dass schweizerische Direktinvestitionen in die EU insbesondere auch vom Wechselkurs beeinflusst werden.

RESUME

Cet article présente l'estimation économétrique des déterminants des flux d'investissement direct suisses à l'étranger. Les statistiques de l'investissement direct des pays récepteurs forment un panel de données annuelles pour 12 pays de l'OCDE entre 1982 et 1992. Les résultats confirment l'existence d'un effet positif de la taille du marché récepteur. Ils font également apparaître un effet négatif du niveau des salaires dans le pays hôte. En ce qui concerne les investissements suisses dans l'UE, ils semblent être particulièrement sensibles aux variations de la valeur du Franc suisse.