Appendix C
Estimation Details

The first section of this appendix looks in detail at the estimation of the elasticities for the trade volume equations presented in chapter 4. We also briefly discuss time trends within the trade-volume equations. Next, we look at the details of the trade-price equations, also discussed in chapter 4. In the final section, we discus the details of the net asset, IPD flows, and net transfers model discussed in appendix B.

Trade Volumes

We will describe each trade-volume equation in its own subsection. The results from the error correction estimates are presented first, followed by those for the Johansen estimation. In each case, the estimation methodology is discussed in more detail in chapter 4. The estimated ECM models include centered seasonals. In view of the relatively short data period, the ECM models are estimated using only the current change in the variables of interest. When detected, misspecification is in most cases eliminated by the use of dummy variables.[1] However, in a few cases, additional lagged changes are added. Except where additional lags have been added, the estimation period for the ECM models is 1980:Q2 to 1995:Q3 for the United States, Germany, Italy, and Canada[2]; 1981:Q2 to 1995:Q2 for Japan; and

1. The results for Germany were also investigated for signs of structural change in light of German reunification. However, there was little evidence of this using the current data set.

2. For Canada, the estimation of the goods-import ECM equation took place over a reduced sample of 1981:1 to 1995:3 because of large errors in the initial part of the sample. Therefore, the results reported here for this equation for Canada refer to this sample period.

1980:Q2 to 1995:Q2 for the United Kingdom and France. Again, in view of the limited data period, the number of lags in the vector autoregression (VAR) for the Johansen estimation is set to 2, so that the estimation period runs from 1980:Q3 to 1995:Q3 for the United States, Germany, Italy, and Canada; from 1981:Q3 until 1995:Q2 for Japan; and from 1980:Q3 to 1995:Q2 for the United Kingdom and France.[3] Finally, where chapter 4 requires additional explanation, the choice of elasticities for each country is discussed.

Goods Exports

Export demand equations are naturally defined as a share relationship, where the share of a country's exports in total world trade depends only on competitiveness. This would imply a long-term parameter on world trade in an unconstrained export equation of unity. However, small deviations from unity might occur, for example, if a country specialized in products with a relatively high income elasticity. Thus, in general we have allowed the long-term coefficient on world trade to be freely estimated, but if implausibly large deviations from unity occur, we have tested the imposition of a unit coefficient.

As can be seen from table C.1a, only in the case of the United States is there no evidence of misspecification for the initial ECM model estimated. For Germany and Japan, additional lags of the change variables are added, with at least one of these lags in each case proving significant. Additional lags of the change variables are also added for the United Kingdom, and although none of the lags are significant, the diagnostics do improve. Therefore, the equation now passes the F-test version of the serial correlation test, with a test statistic of 2.11. The results of the model, including lagged changes, are used as the final ECM model for the United Kingdom and Japan, and it is these parameters that are reported in table 4.1 of chapter 4. For Germany, however, the resulting estimates of the long-term elasticities are still much lower than seems desirable. Therefore, a test of the restriction that the parameters on the log of exports and the log of world trade are equal and opposite is performed. The value of the test statistic is 0.403; thus, the null hypothesis that the parameters are equal and opposite is not rejected at the 5 percent level. This restriction is imposed, and the second ECM model presented for Germany represents this model. The only remaining evidence of misspecification for this model is a marginal failure of the functional form test. (The modified LM, or F-statistic version of this test, which performs better in small samples, is not rejected at the 5 percent level.) This misspecification is not a result of the imposition of the restriction.

3. In several cases, we considered changing the number of lags in the VAR; however, it made little difference to the Johansen results and, therefore, the results presented are based on two lags.

The basic ECM model for France also fails the Lagrange multiplier test for serial correlation, although it passes the modified F-test version with a test statistic of 2.36.[4] The long-term coefficient on relative prices from this model is very low, though. A test of the restriction that the parameters on the log of exports and the log of world trade are equal and opposite is only accepted at the 4 percent level, with a value of the test statistic of 4.178. However, the resulting parameter estimates are more satisfactory and there is no evidence of worsening misspecification, with a value of the modified F-test for serial correlation of 2.31. For Italy, the misspecification is eliminated by the use of a zero-one dummy for 1987:Q3 (*D*873) and the imposition of a unit coefficient on world trade. The addition of the dummy variable alone is not, however, sufficient to completely eliminate the misspecification. The imposition of a unit coefficient is accepted at the 5 percent level (with a test statistic of 0.444) compared to the model with just the dummy variable.

For Canada, while there is no evidence of misspecification for either of the models presented in terms of the tests performed, they are obviously badly specified. The only statistically significant coefficients are two dummy variables, *D*803 and *D*804 (for 1980:Q3 and 1980:Q4, respectively). In addition, for both the basic model and the unconstrained model including the two dummies, the relative price coefficient is incorrectly signed. The imposition of a unit coefficient on world trade can be accepted by the data, with a test statistic of 2.15. This is imposed, therefore, because the resulting coefficient on relative prices becomes correctly signed.

Table C.1b provides the model-choice criteria for the Johansen estimates of the goods-exports-volume equation. Only in the case of Canada is there no evidence of cointegration. In the cases of Japan, the United Kingdom, Italy, and Canada, the choice of cointegrating model is the same for both tests. For Japan, the choice is model 2 with one cointegrating vector; for the United Kingdom it is model 2 with two cointegrating vectors; for Italy it is model 3 with one cointegrating vector; and for Canada it is model 3 with no cointegrating vectors. For the United Kingdom, using the alternative critical values for model 3 discussed in chapter 4, the choice of model 3 with one cointegrating vector cannot be rejected using the λ_{trace} statistic. For Germany, France, and the United States, the results for the λ_{max} and λ_{trace} statistics are different. However, in each case, and also for the United Kingdom, the results shown in table 4.1 of chapter 4 are for model 3 with $r = 1$.

Services Exports

The ECM estimation for the United States produces a model that fails the misspecification test for serial correlation. However, because the absence

4. This slight evidence of misspecification could not be eliminated by the introduction of lagged changes.

Table C.1a Error correction estiation of goods-exports-volume elasticities (dependent variable *DLXGI*)

	United States	Japan		Germany		United Kingdom		France		Italy		Canada	
DLRX	0.078	−0.083	−0.156	−0.140	0.008	0.367	0.364	0.162	0.301	−0.101	−0.178	0.136	0.139
	(0.72)	(−0.48)	(−0.98)	(−0.85)	(0.05)	(3.81)	(3.55)	(1.04)	(2.08)	(−0.49)	(−0.96)	(0.64)	(0.76)
DLS	0.625	0.889	0.770	1.108	1.0111	0.499	0.451	0.992	0.871	1.194	1.033	0.522	0.405
	(3.46)	(3.50)	(3.59)	(4.29)	(3.93)	(2.95)	(2.52)	(4.71)	(4.18)	(3.72)	(3.67)	(1.54)	(1.36)
Constant	−0.995	0.612	0.485	0.019	−0.202	−0.818	−0.862	0.151	−0.147	3.176	3.105	−0.637	−0.160
	(−5.11)	(1.71)	(1.54)	(0.10)	(2.02)	(−3.57)	(−3.34)	(0.90)	(−1.68)	(5.14)	(6.39)	(−1.78)	(−0.78)
*SQ*1	0.0015	0.002	−0.025	0.006	0.004	0.010	0.008	−0.007	−0.013	−0.004	−0.010	0.013	0.012
	(0.23)	(0.24)	(−2.52)	(0.71)	(0.31)	(1.79)	(1.02)	(−0.91)	(−1.90)	(−0.35)	(−1.00)	(1.10)	(1.23)
*SQ*2	0.0004	0.011	0.002	−0.010	−0.010	0.004	0.003	−0.017	−0.020	0.003	0.001	0.003	0.004
	(0.16)	(3.07)	(0.53)	(−2.52)	(−2.68)	(1.58)	(1.36)	(−4.44)	(−5.90)	(0.58)	(0.30)	(0.67)	(1.00)
*SQ*3	−0.0135	0.024	0.008	−0.001	−0.009	0.011	0.009	−0.030	−0.036	−0.007	−0.014	0.009	0.010
	(−2.46)	(3.23)	(0.98)	(−0.17)	(−0.92)	(2.13)	(1.32)	(−4.36)	(−5.67)	(−0.72)	(−1.62)	(0.90)	(1.17)
$LXGI_{-1}$	−0.338	−0.170	−0.128	−0.253		−0.289	−0.296	−0.241		−0.779		−0.124	
	(−5.50)	(−2.81)	(−2.30)	(−2.86)		(−3.34)	(−3.04)	(−2.57)		(−5.79)		(−1.72)	
LRX_{-1}	0.326	0.136	0.156	0.055	0.131	0.324	0.373	0.006	0.085	0.267	0.262	−0.055	0.009
	(5.20)	(1.80)	(2.23)	(0.96)	(2.97)	(3.86)	(3.72)	(0.09)	(1.61)	(3.34)	(4.43)	(−0.58)	(0.14)
LS_{-1}	0.380	0.143	0.103	0.187		0.260	0.270	0.178		0.779		0.163	
	(5.51)	(2.41)	(1.90)	(2.89)		(3.52)	(3.24)	(2.24)		(5.84)		(1.86)	

$DLXGI_{-1}$			−0.481		−0.438		−0.184						
			(−4.24)		(−3.61)		(−1.40)						
$DLRX_{-1}$			0.149		0.012		−0.066						
			(0.89)		(0.08)		(−0.56)						
DLS_{-1}			0.833		0.446		0.024						
			(3.55)		(1.65)		(0.13)						
$(LXGI-LS)_{-1}$					−0.115				−0.127		−0.761		−0.055
					(−1.90)				(1.61)		(−6.39)		(−0.84)
$D873$											0.132		
											(3.62)		
$D803$													−0.096
													(−2.73)
$D804$													0.113
													(3.09)
Adjusted R^2	0.863	0.769	0.834	0.755	0.786	0.335	0.294	0.930	0.926	0.857	0.886	−0.020	0.215
Serial correlation	3.540	20.463	8.108	13.087	5.139	11.943	9.666	10.029	9.679	14.289	8.385	5.927	2.100
Functional form	0.399	0.011	0.558	5.002	4.197	2.000	2.870	0.003	0.544	0.357	0.832	0.940	0.159
Normality	0.844	0.287	0.911	1.789	1.846	0.404	0.840	0.096	0.512	2.966	1.056	1.797	1.375
Heteroskedasticity	1.631	0.125	1.481	4.415	3.875	0.168	0.010	1.298	1.010	1.450	0.079	1.124	0.850

Note: T-statistics are given in parentheses.

Table C.1b Test for number of cointegrating vectors: goods exports

		H_0	United States	Japan	Germany	United Kingdom	France	Italy	Canada
		0	55.021	45.579	39.705	35.552	41.868	37.538	36.057
	λ_{max}	1	19.413	8.243*	19.933	25.051	22.701	22.620	8.432*
		2	10.422	6.502*	6.793*	6.440*	9.228*	4.045*	5.429*
		0	84.856	60.324	66.431	67.042	73.797	64.203	49.918
Model 2	λ_{trace}	1	29.834	14.745*	26.726	31.491	31.929	26.665	13.862*
		2	10.422	6.502*	6.793*	6.440*	9.228*	4.045*	5.429*
			0.594	0.557	0.478	0.447	0.502	0.460	0.446
	Eigenvalues		0.273	0.137	0.279	0.341	0.315	0.310	0.129
			0.157	0.110	0.105	0.102	0.143	0.064	0.085
		0	37.899	22.970	22.531	25.940	23.253	28.401	17.727*
	λ_{max}	1	13.451*	7.295*	13.520*	15.273	13.747*	4.696*	7.278*
		2	2.176*	1.149*	2.986*	1.464*	6.220	3.581*	0.876*
		0	53.526	31.414	39.037	42.677	43.221	36.678	25.881*
Model 3	λ_{trace}	1	15.626	8.444*	16.506	16.737	19.968	8.277*	8.154*
		2	2.176*	1.149*	2.986*	1.464*	6.220	3.581*	0.876*
			0.463	0.336	0.309	0.351	0.321	0.372	0.252
	Eigenvalues		0.198	0.122	0.199	0.225	0.205	0.074	0.112
			0.035	0.020	0.048	0.024	0.098	0.057	0.014

*The null hypothesis cannot be rejected at the 5 percent level.

of serial correlation is still not accepted after adding lagged changes of the variables and none of the lagged changes prove statistically significant, the initial model is the only ECM model reported for the United States. For Japan, neither of the ECM models presented suffer from misspecification. However, in the basic ECM model the long-term coefficient on world income is very low. The second model imposes the restriction that the long-term coefficient on world income is unity. A test within the ECM framework of the validity of this imposition has a test statistic of 1.891; therefore, the null hypothesis that the restriction is valid is easily accepted at the 5 percent level.

The initial ECM estimates for services exports for Germany show only a marginal degree of misspecification. However, the resulting coefficient on world income is negative. Therefore, although the restriction that the long-term coefficient on world income is unity is not accepted, this restriction is imposed, and we estimate a model that includes a time trend. The ECM model for the United Kingdom fails the test for normality and is also reestimated with a time trend and three dummies in the equation (see table C.2a). Again, the long-term coefficient on world trade is implausibly low. However, a test that the long-term coefficient on world income is unity is accepted at the 5 percent level (with a test statistic of 1.391), and this restriction is therefore imposed.

The ECM models for the services-exports-volume equations of Canada and France are not subject to any misspecification, although the resulting coefficients are not particularly satisfactory. The ECM model for Italy fails serial correlation and, therefore, is reestimated with lagged values of the changes of the variables. None of these lagged values are statistically significant, although the model does now pass the F-test version of the serial correlation test, with a test statistic of 2.575. Therefore, the parameters from this model are displayed as the ECM results for Italy in table 4.2 of chapter 4. There is little change in the long-term parameters between the two models, however, and the parameters in the basic model are −0.69 on relative prices and 0.86 on world income.

Turning to the Johansen estimates, table C.2b shows that the choice of model for the United States and the United Kingdom is unclear, with the results for λ_{max} and the λ_{trace} statistics differing. For the United States, the λ_{max} suggests that we should choose model 2 with $r = 1$ and the λ_{trace} suggests that we should chose model 3 with $r = 1$. For the United Kingdom, the λ_{max} suggests that we should chose model 2 with $r = 2$ and the λ_{trace} suggests that we should chose model 3 with $r = 1$. As the λ_{trace} statistic is generally regarded as more robust, the Johansen estimates that are presented for United States and United Kingdom services exports are those for model 3 with $r = 1$. The services export equation for Japan is weakly determined, with the Johansen approach in each case suggesting that there are no cointegrating vectors. For Germany, Italy, France, and Canada both tests indicate that we should chose model 3, with $r = 1$. For both

Table C.2a Error correction estimation of services-exports-volume elasticities (dependent variable *DLXS*)

	United States	Japan		Germany		United Kingdom		France	Italy		Canada
DLRS	0.053	1.274	1.291	−0.237	-0.592	0.333	0.352	1.248	2.074	2.192	−0.258
	(0.47)	(8.64)	(8.71)	(−0.52)	(−1.21)	(3.16)	(4.11)	(3.61)	(4.16)	(4.23)	(−0.66)
DLYW	−1.282	−1.622	−1.087	−1.315	0.399	0.614	1.351	0.282	−2.120	−0.164	−0.670
	(−1.60)	(−1.18)	(−0.82)	(−0.96)	(0.29)	(0.77)	(2.19)	(0.25)	(−0.88)	(−0.05)	(−0.47)
Constant	−3.800	0.633	−0.108	5.980	−2.439	5.208	−1.729	1.264	4.423	5.638	−1.299
	(−3.01)	(1.17)	(−2.68)	(4.20)	(−4.62)	(3.64)	(−4.02)	(0.98)	(2.34)	(2.75)	(−1.18)
*SQ*1	0.020	−0.005	−0.005	−0.024	−0.024	0.022	0.026	−0.008	−0.010	0.000	0.034
	(5.98)	(1.28)	(−1.31)	(5.62)	(−5.40)	(3.98)	(5.93)	(−2.40)	(−0.99)	(0.01)	(2.48)
*SQ*2	0.016	−0.010	−0.010	−0.002	0.0008	0.041	0.043	0.031	0.066	0.070	0.123
	(5.11)	(−2.51)	(−2.46)	(−0.49)	(0.16)	(6.37)	(8.87)	(7.80)	(5.17)	(5.16)	(7.44)
*SQ*3	0.034	0.006	0.006	0.008	0.011	0.077	0.078	0.023	0.067	0.057	0.149
	(10.53)	(1.420)	(1.54)	(1.87)	(2.28)	(15.38)	(20.17)	(6.70)	(7.59)	(5.49)	(16.53)
LXS_{-1}	−0.365	−0.186		−0.664		−0.383		−0.065	−0.472	−0.599	−0.491
	(−4.66)	(−2.90)		(−5.64)		(−3.94)		(−0.86)	(−4.28)	(−4.70)	(−4.44)
LRS_{-1}	0.118	0.059	0.045	0.886	0.430	0.272	0.219	0.225	0.324	0.433	0.394
	(2.62)	(0.68)	(0.51)	(4.07)	(2.62)	(3.21)	(3.03)	(1.51)	(1.613)	(1.91)	(3.21)
LYW_{-1}	0.623	0.093		−0.468		−0.216		−0.117	0.406	0.512	0.250
	(3.43)	(1.50)		(−3.13)		(−2.13)		(−0.71)	(2.25)	(2.63)	(1.74)

$(LXS - LYW)_{-1}$			−0.136 (−2.56)		−0.526 (−4.71)		−0.303 (−4.03)				
$D911$							−0.115 (−4.80)				
$D874$							−0.079 (−3.21)				
$D894$							−0.078 (−3.31)				
$DLXS_{-1}$										0.206 (1.56)	
$DLRS_{-1}$										−0.158 (−0.23)	
$DLYW_{-1}$										−4.154 (−1.52)	
$TREND$					−0.005 (−4.11)		−0.003 (−3.32)				
Adjusted R^2	0.804	0.675	0.669	0.705	0.668	0.957	0.974	0.802	0.819	0.819	0.973
Serial correlation	13.435	2.956	2.668	6.882	8.020	4.862	3.285	5.218	14.262	11.361	6.676
Functional form	1.437	2.636	2.506	4.321	2.745	0.053	1.519	0.459	0.844	2.243	0.014
Normality	0.232	5.260	4.230	0.026	0.283	13.812	0.904	0.829	0.691	0.912	1.248
Heteroskedasticity	0.941	0.067	0.112	0.099	0.127	0.019	0.001	0.015	0.340	0.019	1.600

Note: T-statistics are given in parentheses.

Table C.2b Test for number of cointegrating vectors: services exports

		H_0	United States	Japan	Germany	United Kingdom	France	Italy	Canada
Model 2	λ_{max}	0	43.624	16.991*	28.518	73.321	31.729	63.955	117.908
		1	12.538*	11.123*	22.944	32.072	16.671	23.191	24.348
		2	8.654*	5.541*	7.590*	6.368*	7.234*	3.088*	2.261*
	λ_{trace}	0	64.816	33.654*	59.053	111.761	55.634	90.234	144.516
		1	21.192	16.663*	30.535	38.439	23.905	26.279	26.609
		2	8.654*	5.541*	7.590*	6.368*	7.234*	3.088*	2.261*
	Eigenvalues		0.511	0.262	0.373	0.705	0.411	0.650	0.855
			0.186	0.180	0.313	0.414	0.243	0.316	0.329
			0.132	0.094	0.117	0.101	0.114	0.049	0.036
Model 3	λ_{max}	0	31.116	12.828*	27.571	73.076	22.886	63.951	117.876
		1	9.172*	5.967*	8.002*	14.944	9.074*	3.258*	4.331*
		2	1.445*	2.398*	0.00018*	0.340*	3.558*	0.073*	0.070*
	λ_{trace}	0	41.733	21.192*	35.572	88.360	35.518	67.282	122.278
		1	10.617*	8.365*	8.002*	15.284*	12.632*	3.331*	4.401*
		2	1.445*	2.398*	0.00018*	0.340*	3.558*	0.073*	0.070*
	Eigenvalues		0.400	0.205	0.364	0.704	0.317	0.649	0.855
			0.140	0.101	0.123	0.220	0.140	0.052	0.069
			0.023	0.042	0.000003	0.006	0.058	0.001	0.001

*The null hypothesis cannot be rejected at the 5 percent level.

France and Italy, low values for the income elasticity suggest a test for imposing a unitary elasticity. This is accepted in both cases, with test statistics of 0.357 and 2.877, respectively. However, in the case of France, the resulting price elasticity is even more unsatisfactory (see table 4.2 in chapter 4). That, combined with poor estimates from the ECM model, lead us to impose an arbitrary set of elasticities for France.

Goods Imports

The basic ECM models for the United States, Germany, Japan, and the United Kingdom do not display signs of misspecification. For both Germany and the United States, only one ECM equation is reported, therefore, although in neither case are the results completely satisfactory. In the case of Japan, the income elasticity is very low for the initial equation, while the price elasticity is high compared to the mean import price elasticity of −0.97 for Japan in the studies surveyed by Hooper and Marquez (1995, 131, table 4.2). Therefore, higher long-term income elasticities are imposed to see if they yield improved results. An income elasticity of 1.2 is accepted for Japan, with a test statistic of 0.802. Therefore, this elasticity is imposed and the ECM model is reestimated. The resulting price elasticity is now closer to the mean observed in Hooper and Marquez (1995). For the United Kingdom, although the initial ECM equation is not misspecified, the resulting long-term price elasticity is of the wrong sign. Examination of the residuals reveals a large outlier in 1981:3, and this is eliminated with a zero-one dummy. This does not change the sign of the price elasticity. However, reducing the high income elasticity to a value of two, a restriction that can be accepted by the data with a test statistic of 2.365, produces a price elasticity of the requisite sign.

The ECM equations for France, Italy, and Canada display signs of misspecification. For Italy, this misspecification can be eliminated by the addition of a dummy variable (for 1980:Q3). For France, additional lagged changes prove necessary. For Italy and France, it is these results that are displayed as the long-term parameters in table 4.3 of chapter 4. The results for Canada are for a truncated sample period, 1981:Q1 to 1995:Q3. Again, the model is not particularly well defined, and the resulting long-term income elasticity is very high. The restriction that this can be reduced to 2.5 can be accepted by the data (with a test statistic of 3.042) and is imposed.

The Johansen estimates only produce satisfactory results, with evidence of cointegration, for France and Italy. In both these cases, model 3 is unambiguously chosen, with one cointegrating vector. For Japan and Canada, the model choice is also unambiguous (being models 3 and 2, respectively), but in each case the results suggest that there are no cointegrating relationships. For Germany and the United Kingdom, again the results suggest that there are no cointegrating relationships. For Germany, the λ_{max} statistic suggests that model 3 should be chosen and the λ_{trace} suggests that model 2 be chosen. The reverse is true for the United Kingdom. (The results for Germany displayed in table 4.3 of chapter 4 are those for model 2 with $r = 1$.) The choice of model for the United States depends on which statistic is used. The λ_{max} statistic suggests that we should chose model 2 with $r = 0$, while the λ_{trace} statistic suggests that the estimated model for the United States should be model 3 with $r = 2$. The results for the United States displayed in table 4.3 of chapter 4 are those for the first cointegrating relationship of model 3. See tables C.3a and C.3b for our results for goods imports.

Services Imports

The misspecification tests for the ECM equations show that the initial estimation results for the United States fail the normality test at the 5 percent level. This failure proves to be caused by one large outlier in 1982:Q1, and the United States passes the test when we add a dummy (*D*821) to account for this. For France, problems with normality in the initial model can also be eliminated with the introduction of a dummy for 1982:Q1. The resulting long-term elasticities are both high, however. The imposition of a long-term income elasticity of two can be accepted by the data, with a test statistic of 0.282. This value of the long-term income elasticity also reduces the price elasticity. The German ECM estimates fail both the tests for functional form and serial correlation. Additional lags of the change in the variables for the German ECM regression do not prove significant and do not improve the test statistics for serial correlation or functional form. Therefore, only the results of the more parsimonious regression for Germany are presented here.

The ECM results for Japan, Italy, and the United Kingdom do not display any signs of misspecification. In the case of the United Kingdom, though, the long-term income elasticity is low. The restriction that this parameter take a long-term value of one can be accepted by the data, with a test statistic of 2.265; therefore, this value is imposed. For Italy, however, the competitiveness elasticities are low. A value of −1.0 can be accepted by the data, though, with a test statistic of 2.07. The model is reestimated with this restriction imposed.

For Canada, there is slight evidence of misspecification, because the ECM model for import services marginally fails the Lagrange multiplier test for serial correlation. However, the model passes the F-test with a test statistic of 2.259. As the estimates produce sensible parameter values and all the long-term coefficients are highly significant, this is the model used for Canada.

The choice of model for the Johansen estimation is not clear cut for the United States as the λ_{max} statistic suggests that the model should be model 2, with $r = 1$ and the λ_{trace} statistic model 3, with $r = 1$. As the λ_{trace} statistic is generally more robust, the results presented here are for model 3 with one cointegrating relationship. The choice for Japan is similarly confused, with the λ_{max} statistic suggesting that we choose model 3, with $r = 0$, and the λ_{trace} statistic suggesting we choose model 3, with $r = 1$. Again, the Johansen estimates presented for Japan in table 4.4 of chapter 4 are for model 3 for $r = 1$.

The Johansen results for Germany and the United Kingdom in table 4.4 are those for model 3 and one cointegrating relationship. However, the choice of $r = 1$ for the number of cointegrating relationships is only applicable when the critical values used to evaluate model 3 are those for the case where model 3 is over parameterized compared to the DGP. If these critical values are ignored, then both test statistics indicate that for Germany and the United Kingdom we should chose model 2 with $r = 2$. (The resulting parameter estimates for Germany would not change [for two decimal places] if the results for the most stationary of the two cointegrating vectors for model 2 are used.) For Italy and Canada, both test statistics also suggest that we choose model 2 , with $r = 1$ and $r = 0$, respectively. For France, the λ_{max} statistic suggests that we choose model 2, with $r = 1$ and the λ_{trace} statistic model 3, with $r = 0$. The Johansen results for France displayed in table 4.4 are for model 2 with $r = 1$, because the result of no cointegration is uninteresting. See tables C.4a and C.4b for our results for services imports.

Trends in Trade Volumes

Within the FEER simulations, the parameters chosen for the trade-volume elasticities are those discussed above and in chapter 4. However, as the functional form of the equations in appendix B suggests, the FEER simulations allow for the possibility of time trends within the trade-volume equations. The trend and constant for each equation are reestimated before running the model for given values of the other world parameters. In each case, centered seasonal dummies are included in this estimation to eliminate bias in the estimation of the trend. These are set to zero, however, in calculations of the trend current account. The time trends for each of the trade-volume equations are reported in table 5.4 and are mostly small.[5] Figures C.1 through C.14 plot the fitted and actual values from the equations for goods trade volumes.

5. In the case of German goods exports, the results reported incorporate a split trend, which kinks in 1986:1. The reported trend for German goods exports, therefore, only applies from 1986:1.

Table C.3a Error correction estimation of goods-imports-volume elasticities (dependent variable DLMGI)

	United States		Japan	Germany	United Kingdom		France		Italy		Canada	
DLR	0.292	−0.389	−0.354	−0.245	0.248	0.118	−0.231	−0.229	0.030	0.073	0.053	0.111
	(1.89)	(−3.04)	(−2.91)	(−1.73)	(2.20)	(1.21)	(−2.65)	(−2.52)	(0.20)	(0.60)	(0.29)	(0.60)
DLY	2.166	1.598	1.652	1.039	1.963	2.163	2.835	2.904	0.538	1.129	2.193	2.076
	(5.07)	(2.78)	(2.90)	(3.61)	(3.57)	(4.88)	(7.17)	(7.41)	(0.74)	(1.85)	(4.47)	(4.19)
Constant	−5.054	0.053	−0.688	−0.568	−2.572	−1.646	−6.869	−8.382	−9.323	−10.489	−1.265	−0.491
	(−4.71)	(0.06)	(−1.92)	(−1.12)	(−3.18)	(−2.88)	(−6.11)	(−5.87)	(−4.18)	(−5.67)	(−1.61)	(−0.74)
*SQ*1	−0.011	−0.017	−0.016	−0.023	-0.003	−0.004	−0.008	−0.003	−0.015	−0.015	−0.001	−0.001
	(−4.18)	(−5.56)	(−5.50)	(−7.00)	(−1.23)	(−1.57)	(−1.94)	(−0.61)	(−3.04)	(−3.67)	(−0.27)	(−0.18)
*SQ*2	0.005	−0.012	−0.011	−0.016	0.002	0.002	−0.009	−0.004	−0.015	−0.015	−0.001	−0.000
	(1.86)	(−4.10)	(−4.02)	(−5.41)	(0.84)	(0.67)	(−2.48)	(−1.19)	(−3.12)	(−3.74)	(−0.18)	(−0.06)
*SQ*3	−0.002	−0.014	−0.014	−0.027	−0.000	−0.002	−0.032	−0.029	−0.045	−0.048	0.001	0.001
	(−0.83)	(−4.95)	(−4.93)	(−8.94)	(−0.09)	(−0.90)	(−9.11)	(−8.13)	(−9.25)	(−11.7)	(0.29)	(0.41)
$LMGI_{-1}$	−0.397	−0.102		−0.201	−0.355		−0.835	−1.020	−0.548	−0.560	−0.098	
	(−4.64)	(−1.27)		(−1.98)	(−3.56)		(−6.37)	(−5.98)	(−4.55)	(−5.64)	(−1.31)	
LR_{-1}	−0.149	−0.180	−0.157	−0.073	0.001	−0.056	−0.327	−0.409	−0.050	−0.008	−0.047	−0.062
	(−2.86)	(−3.09)	(−3.01)	(−1.05)	(0.02)	(−1.64)	(−5.21)	(−5.25)	(−0.72)	(−0.14)	(−0.53)	(−0.69)
LY_{-1}	0.965	0.072		0.241	0.767		1.574	1.921	1.235	1.339	0.318	
	(4.71)	(0.55)		(1.69)	(3.33)		(6.27)	(5.95)	(4.44)	(5.82)	(1.55)	

$(LMGI - 1.2^{*}LY)_{-1}$			−0.136									
			(−1.92)									
$(LMGI - 2^{*}LY)_{-1}$						−0.255						
						(−2.88)						
$(LMGI - 2.5^{*}LY)_{-1}$												−0.054
												(−0.75)
$DLMGI_{-1}$								0.020				
								(0.15)				
DLR_{-1}								0.214				
								(2.24)				
DLY_{-1}								0.983				
								(2.22)				
*D*813						0.086						
						(3.05)						
*D*803										0.167		
										(5.12)		
Adjusted R^2	0.674	0.516	0.518	0.699	0.423	0.502	0.948	0.955	0.857	0.903	0.234	0.203
Serial correlation	2.991	3.108	1.331	5.871	7.345	3.350	14.421	9.020	7.433	4.911	1.924	0.894
Functional form	0.623	0.001	0.001	0.163	0.205	0.138	0.114	0.075	0.196	0.820	10.814	10.115
Normality	3.886	0.900	1.177	0.206	0.891	0.282	0.454	0.249	36.193	1.765	2.792	0.139
Heteroskedasticity	2.067	0.191	0.073	0.244	1.385	1.163	1.118	0.000	0.015	0.908	1.379	5.586

Note: T-statistics are given in parentheses.

Table C.3b Test for number of cointegrating vectors: goods imports

		H_0	United States	Japan	Germany	United Kingdom	France	Italy	Canada
Model 2	λ_{max}	0	21.549*	24.836	22.193	18.661*	59.912	32.984	18.248*
		1	14.545*	11.118*	8.636*	15.056*	18.278	22.010	8.045*
		2	9.695	5.254*	2.627*	6.122*	7.280*	6.546*	3.396*
	λ_{trace}	0	45.789	41.207	33.456*	39.839	85.471	61.539	29.689*
		1	24.240	16.372*	11.263*	21.178	25.558	28.555	11.441*
		2	9.695	5.254*	2.627*	6.122*	7.280*	6.546*	3.396*
	Eigenvalues		0.298	0.358	0.305	0.267	0.632	0.418	0.259
			0.212	0.180	0.132	0.222	0.263	0.303	0.124
			0.147	0.090	0.042	0.097	0.114	0.102	0.054
Model 3	λ_{max}	0	16.381*	11.153*	16.739*	16.879*	58.749	32.977	17.589*
		1	14.542	5.972*	8.041*	11.809*	9.462*	9.035*	6.629*
		2	1.030*	1.867*	0.177*	0.846*	0.250*	0.118*	0.095*
	λ_{trace}	0	31.952	18.992*	24.957*	29.534*	68.461	42.131	24.313*
		1	15.571	7.839*	8.217*	12.655*	9.712*	9.154*	6.724*
		2	1.030*	1.867*	0.177*	0.846*	0.250*	0.118*	0.095*
	Eigenvalues		0.236	0.181	0.240	0.245	0.624	0.418	0.251
			0.212	0.101	0.124	0.179	0.146	0.138	0.103
			0.017	0.033	0.003	0.014	0.004	0.002	0.002

*The null hypothesis cannot be rejected at the 5 percent level.

Table C.4a Error correction estimation of services-imports-volume elasticities (dependent variable DLMS)

	United States		Japan	Germany	United Kingdom		France		Italy		Canada
DLRS	−0.817	−0.776	0.055	−1.085	−0.715	−0.758	−0.917	−0.879	−0.107	−0.197	−0.836
	(−6.00)	(−6.73)	(0.39)	(−2.99)	(−5.74)	(−6.17)	(−2.38)	(−2.70)	(−0.30)	(−0.55)	(−3.20)
DLY	1.520	2.118	0.089	0.505	0.544	1.052	0.448	0.675	−0.815	−0.065	0.634
	(2.83)	(4.49)	(0.12)	(1.45)	(0.81)	(1.80)	(0.48)	(0.88)	(−0.60)	(−0.05)	(1.21)
Constant	−1.838	−1.209	−0.426	−1.331	2.559	−0.973	−1.892	−1.262	−3.168	−4.293	−1.370
	(−1.70)	(−1.31)	(−0.94)	(−2.43)	(2.75)	(−3.33)	(−1.03)	(−1.66)	(−1.83)	(−2.75)	(−2.55)
*SQ*1	0.028	0.029	0.002	0.026	0.026	0.031	0.001	0.005	−0.013	−0.013	0.054
	(6.14)	(7.52)	(0.54)	(3.14)	(3.39)	(4.17)	(0.31)	(1.46)	(−2.21)	(−2.20)	(14.83)
*SQ*2	0.061	0.065	0.006	0.052	0.072	0.077	0.016	0.018	−0.004	−0.002	0.023
	(12.65)	(15.64)	(1.66)	(5.55)	(7.72)	(8.88)	(3.75)	(4.86)	(−0.60)	(−0.32)	(7.34)
*SQ*3	0.049	0.051	0.018	0.094	0.099	0.102	0.027	0.028	0.012	0.014	0.028
	(14.04)	(17.06)	(4.80)	(13.26)	(16.69)	(17.76)	(6.50)	(7.92)	(2.04)	(2.42)	(8.76)
LMS_{-1}	−0.183	−0.093	−0.131	−0.454	−0.387		−0.199		−0.326		−0.187
	(−2.26)	(−1.31)	(−2.42)	(−3.86)	(−3.69)		(−2.38)		(−3.24)		(−2.70)
LRS_{-1}	−0.199	−0.115	−0.157	−0.566	−0.259	−0.324	−0.290	−0.219	−0.111		−0.215
	(−2.20)	(−1.47)	(−2.83)	(−3.00)	(−2.30)	(−3.07)	(−1.36)	(−1.79)	(−1.07)		(−2.42)
LY_{-1}	0.337	0.209	0.126	0.446	0.174		0.376		0.690	0.643	0.343
	(1.89)	(1.36)	(2.02)	(3.31)	(1.24)		(1.36)		(3.35)	(3.13)	(2.81)
$(LMS - LY)_{-1}$						−0.326					
						(−3.33)					
$(\mathrm{LMS} - 2{*}LY)_{-1}$								−0.122			
								(−1.66)			
$(LMS + LRS)_{-1}$										−0.221	
										(−3.14)	
*D*821		0.165						−0.173			
		(4.71)						(−4.40)			
Adjusted R^2	0.905	0.932	0.439	0.956	0.974	0.973	0.559	0.679	0.366	0.353	0.867
Serial correlation	8.664	6.378	2.435	22.513	5.469	5.878	3.378	4.319	2.385	3.555	9.654
Functional form	0.026	0.135	0.637	10.715	3.601	1.866	0.457	0.095	0.001	0.683	1.113
Normality	18.841	2.596	0.852	0.879	0.223	0.435	11.282	1.045	2.131	2.556	2.689
Heteroskedasticity	0.236	0.654	0.012	0.409	1.107	1.522	0.423	0.866	0.591	0.911	0.011

Note: T-statistics are given in parentheses.

Table C.4b Test for number of cointegrating vectors: services imports

		H_0	United States	Japan	Germany	United Kingdom	France	Italy	Canada
Model 2	λ_{max}	0	46.181	26.872	75.782	93.814	26.011	41.645	14.434*
		1	15.615*	16.474	17.702	20.632	13.912*	10.470*	10.073*
		2	9.527	8.211*	6.599*	5.086*	5.544*	3.266*	2.177*
	λ_{trace}	0	71.322	51.557	100.082	119.532	45.467	55.381	26.683*
		1	25.141	24.685	24.300	25.718	19.456*	13.737*	12.250*
		2	9.527	8.211*	6.599*	5.086*	5.544*	3.266*	2.177*
	Eigenvalues		0.531	0.381	0.711	0.791	0.352	0.495	0.211
			0.226	0.255	0.252	0.291	0.207	0.158	0.152
			0.145	0.136	0.103	0.081	0.088	0.052	0.035
Model 3	λ_{max}	0	46.181	17.765*	75.781	93.797	22.408	31.051	12.760*
		1	11.342*	8.390*	14.778	15.680	5.704*	3.454*	7.261*
		2	0.655*	4.227	1.107*	0.238*	1.278*	1.276*	0.164*
	λ_{trace}	0	58.178	30.381	91.666	109.715	29.390*	35.781	20.185*
		1	11.998*	12.617*	15.884	15.918	6.982*	4.730*	7.425*
		2	0.655*	4.227	1.107*	0.238*	1.278*	1.276*	0.164*
	Eigenvalues		0.531	0.272	0.711	0.791	0.312	0.399	0.189
			0.170	0.139	0.215	0.230	0.091	0.055	0.112
			0.011	0.073	0.018	0.004	0.021	0.021	0.003

*The null hypothesis cannot be rejected at the 5 percent level.

Figure C.1 US goods imports, March 1980–September 1995

millions of 1990 US dollars

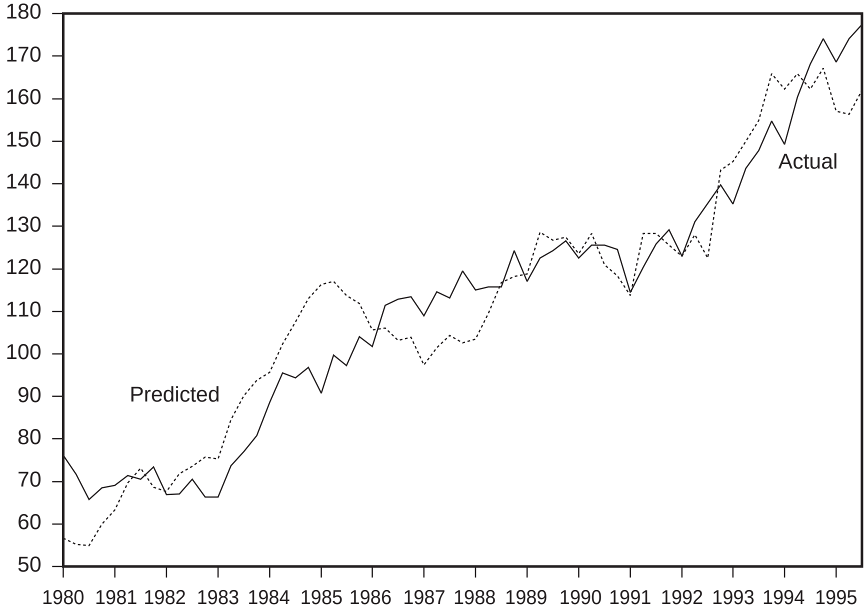


Figure C.2 US goods exports, March 1980–September 1995

millions of 1990 US dollars

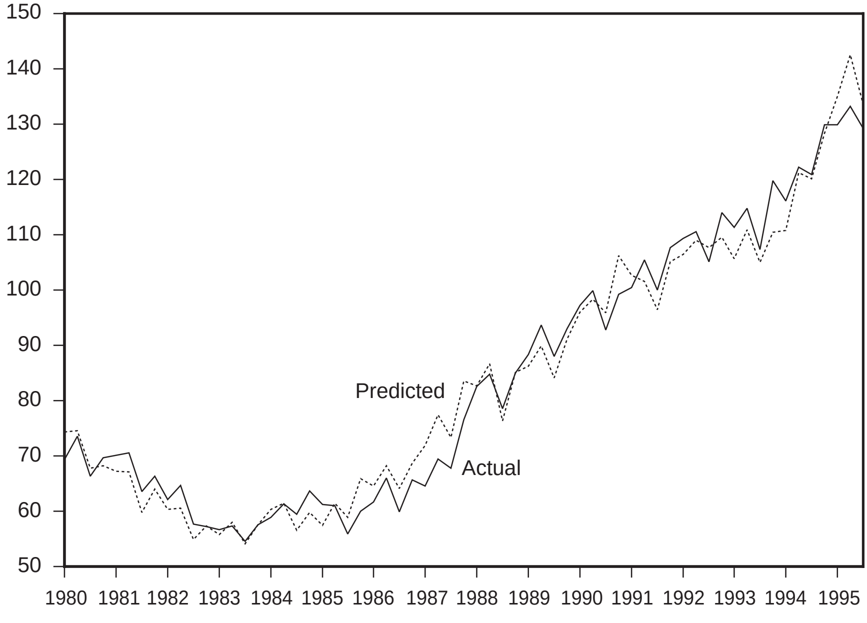


Figure C.3 German goods imports, March 1980–September 1995

millions of 1990 deutsche marks

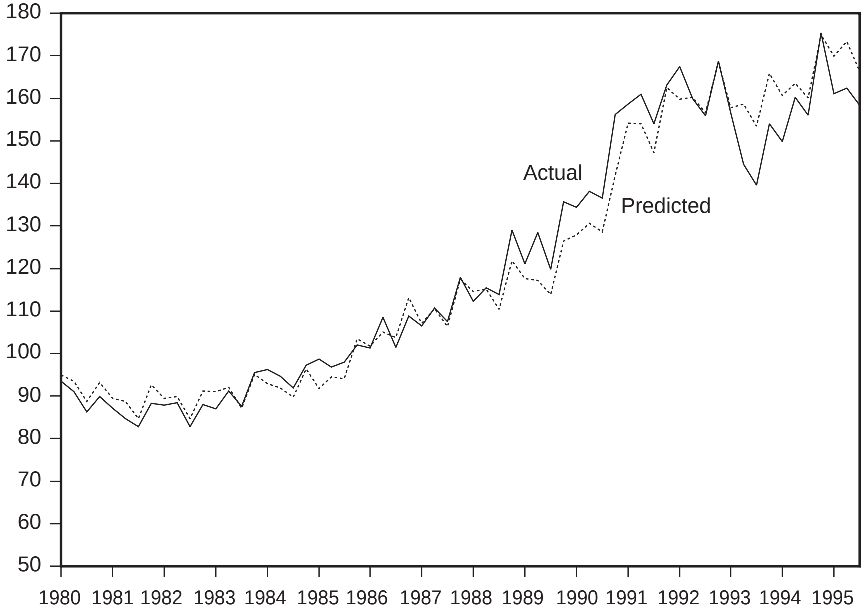


Figure C.4 German goods exports, March 1980–September 1995

millions of 1990 deutsche marks

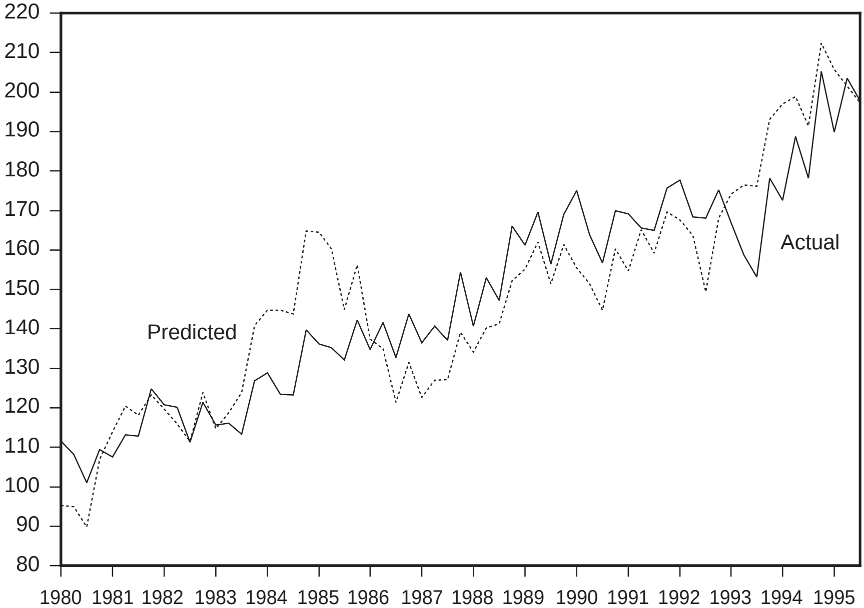


Figure C.5 Japanese goods imports, March 1981–June 1995

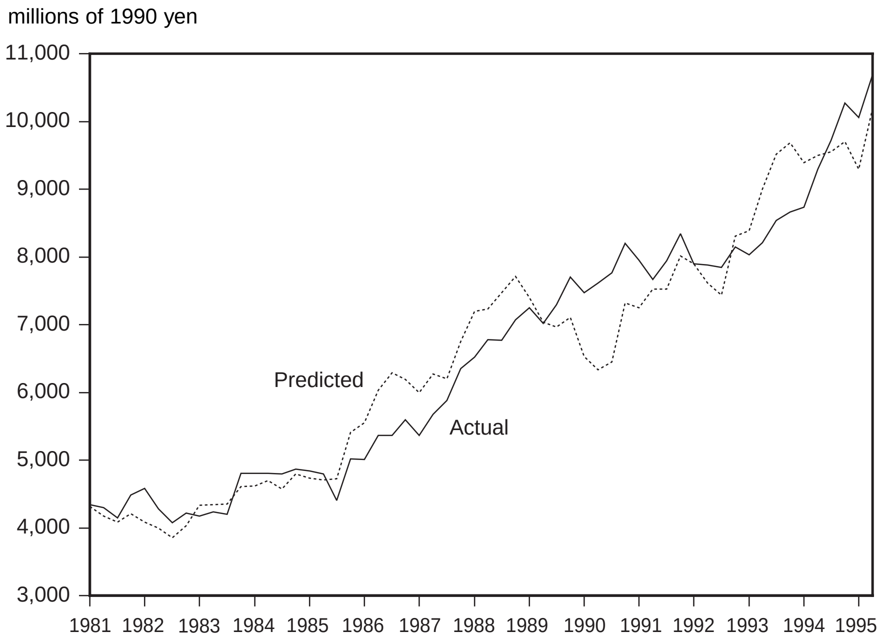


Figure C.6 Japanese goods exports, March 1981–June 1995

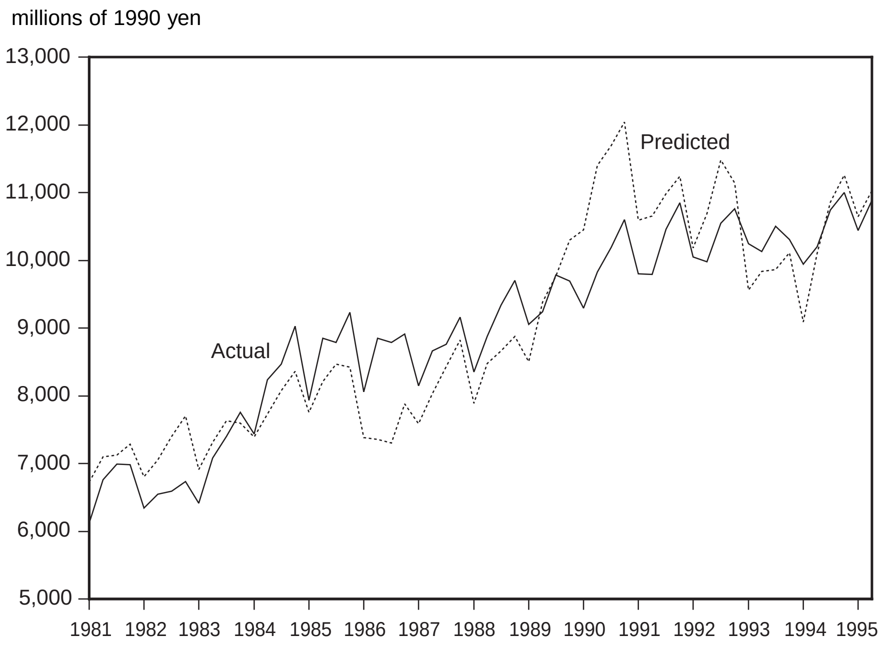


Figure C.7 UK goods imports, March 1980–June 1995

millions of 1990 pounds

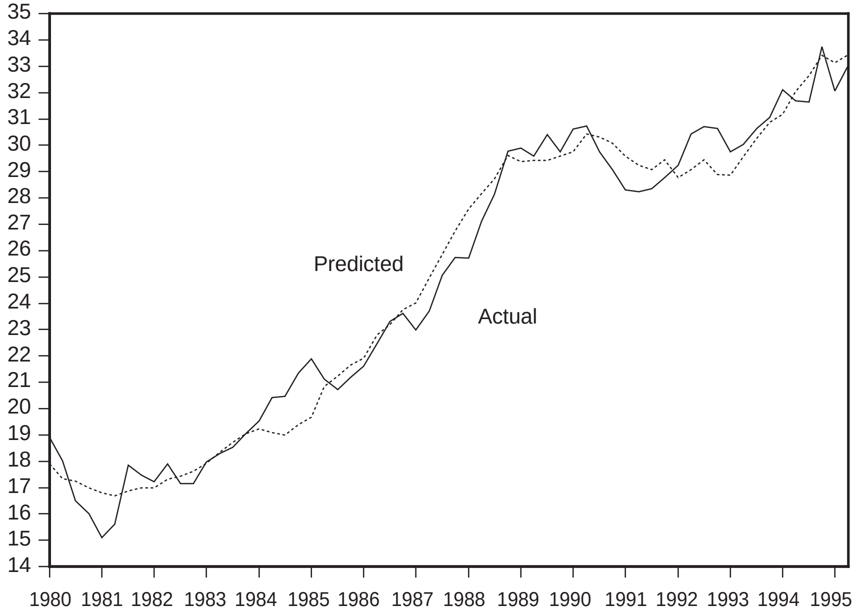


Figure C.8 UK goods exports, March 1980–June 1995

millions of 1990 pounds

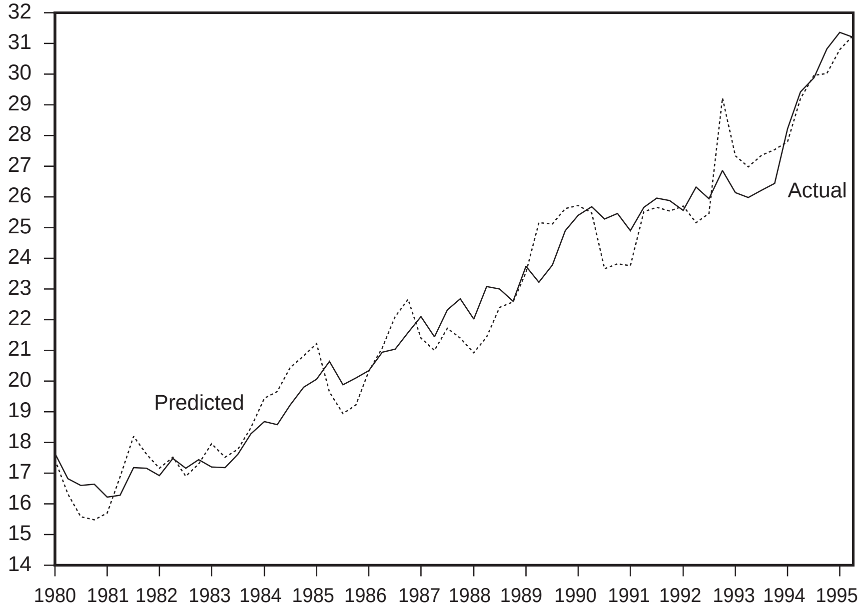


Figure C.9 French goods imports, March 1980–June 1995

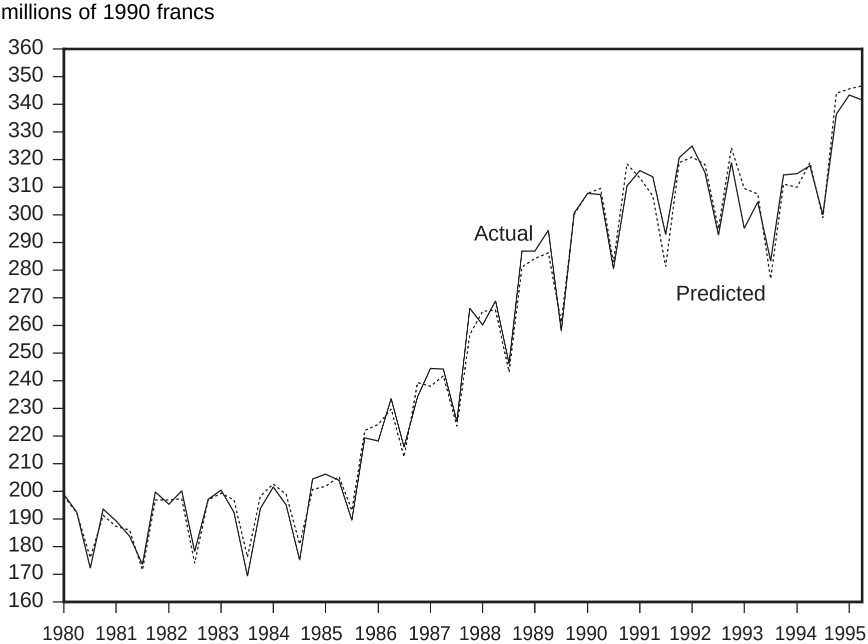


Figure C.10 French goods exports, March 1980–June 1995

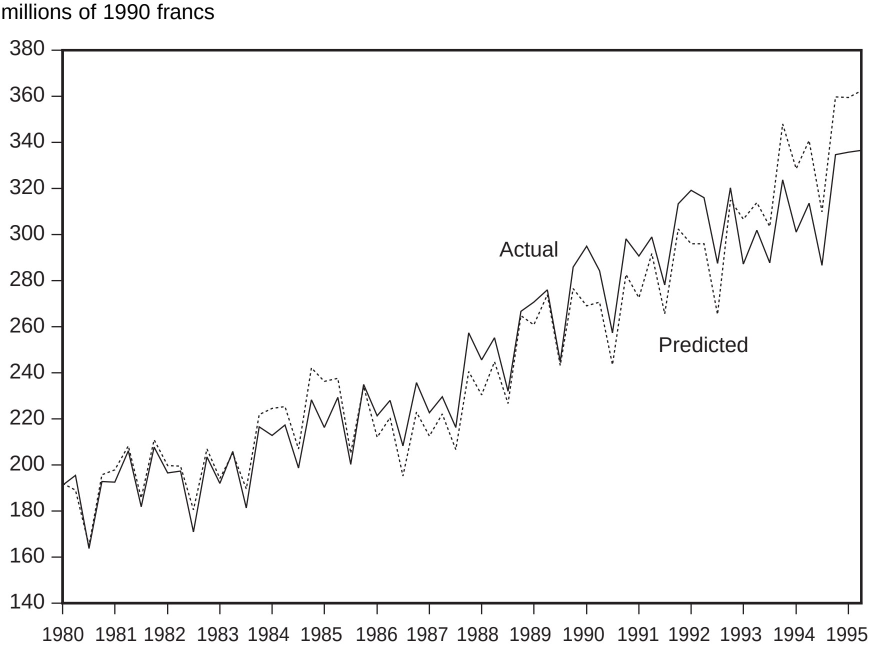


Figure C.11 Italian goods imports, March 1980–September 1995

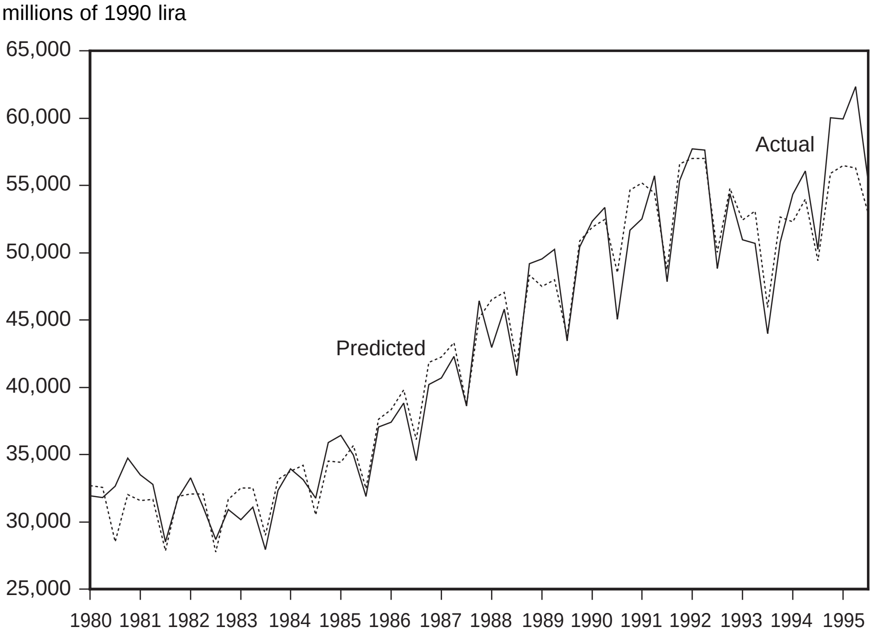


Figure C.12 Italian goods exports, March 1980–September 1995

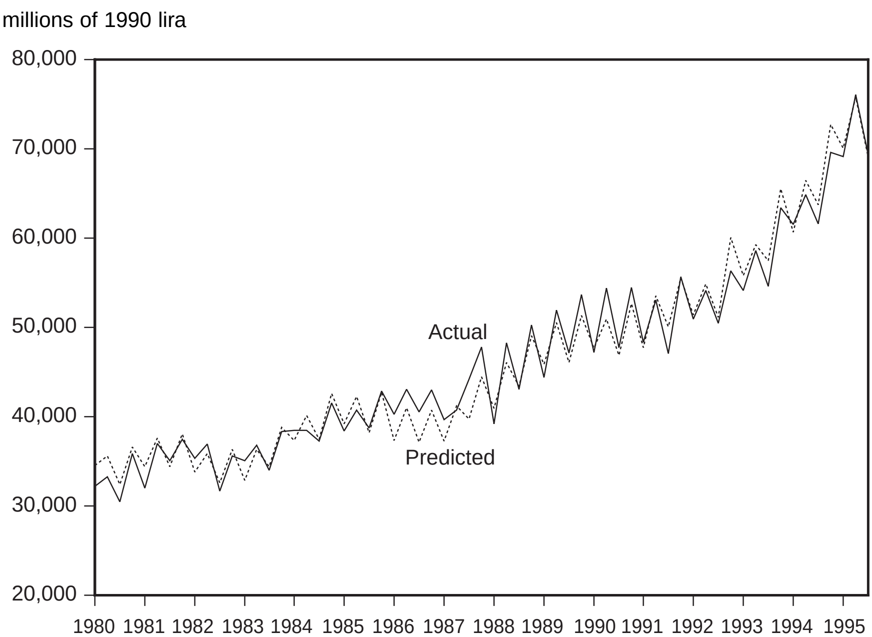


Figure C.13 Canadian goods imports, March 1982–September 1995

millions of 1990 Canadian dollars

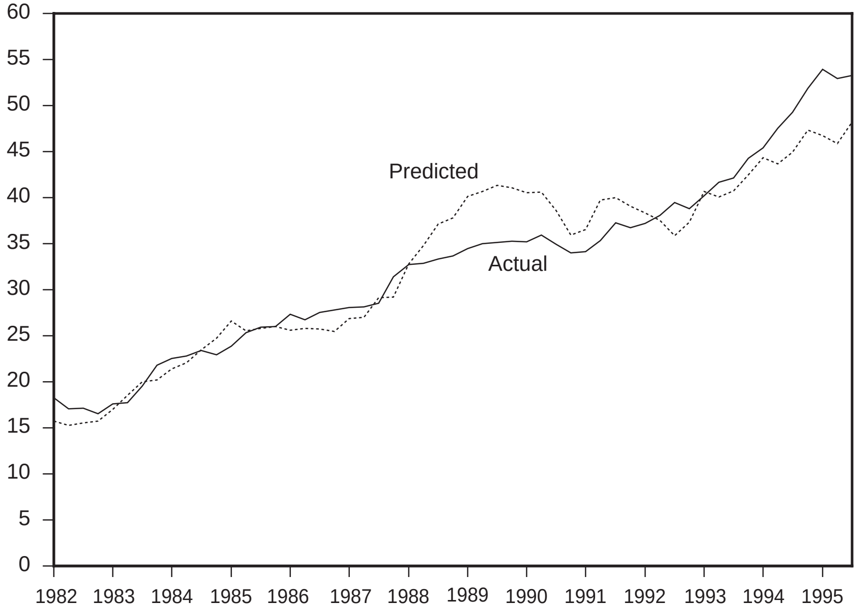
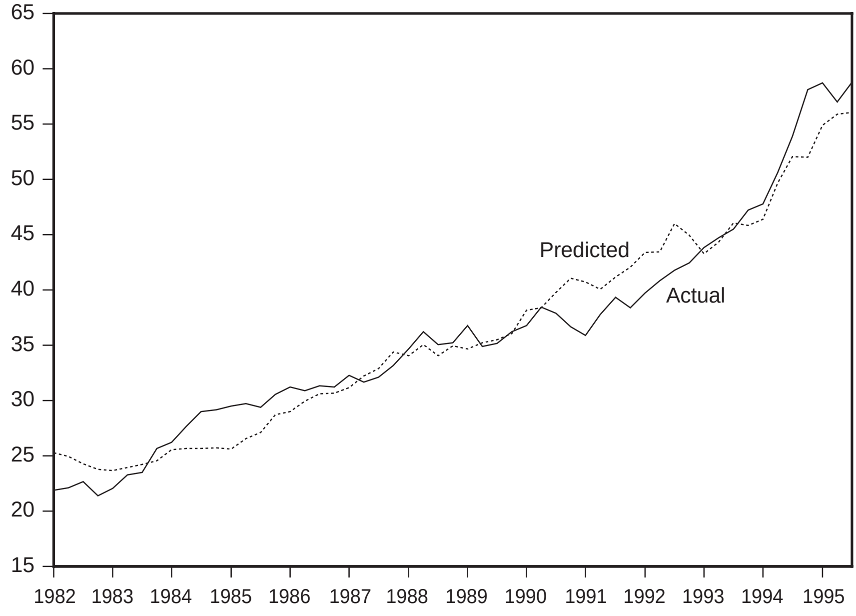


Figure C.14 Canadian goods exports, March 1982–September 1995

millions of 1990 Canadian dollars



Choice of Parameters for Price Equations

This section examines more closely the choice of elasticities for the trade-price equations presented in chapter 4. The elasticities are for import and export prices with respect to world trade prices for each country. These are obtained using only error-correction-mechanism techniques. We present three estimates: an unconstrained model, a model that allows the hypothesis of price homogeneity to be tested, and a model that imposes homogeneity.

To illustrate, consider the equation from appendix B for manufactured export prices:

$$PXG = (WPXG * r)^{B_2} PD^{1-B_2}, \tag{C.1}$$

where *PXG* is the price of manufactured exports, *WPXG* is the world price of manufactured exports, r is the nominal exchange rate (domestic currency/US dollar) and *PD* is domestic prices. An estimate of the parameter of interest, B_2, can be obtained by estimating the following error correction mechanism:

$$\begin{aligned} DLPXG_t = {} & b_1 + b_2 DL(WPXG * r / r_0)_t + b_3 DLPD_t + b_4 LPXG_{t-1} \\ & + b_5 L(WPXG * r / r_0)_{t-1} + b_6 LPD_{t-1} + u_t, \end{aligned} \tag{C.2}$$

where D is the difference operator, L is the natural log of the variable, r_0 is the nominal dollar exchange rate in the base period of the price series, and u_t is an error term. Therefore, the long-term estimate of B_2 is given by b_5/b_4. This can be reparameterized as:

$$\begin{aligned} DLPXG_t = {} & b_1 + b_2 DL(WPXG * r / r_0)_t + b_3 DLPD_t + b_4 L(PXG - PD)_{t-1} \\ & + b_5 L((WPXG * r / r_0) - PD)_{t-1} + b_6 LPD_{t-1} + u_t, \end{aligned} \tag{C.3}$$

where all variables are as previously defined. Under the assumption of price homogeneity, the coefficients on *WPXG* and *PD* should sum to unity, so homogeneity can be tested by establishing whether the coefficient b_6 is significantly different from zero. Accepting that b_6 is zero implies that price homogeneity exists. Again, the long-term estimate of B_2 is given by b_5/b_4. Finally, imposing price homogeneity involves estimating the model:

$$\begin{aligned} DLPXG_t = {} & b_1 + b_2 DL(WPXG * r / r_0)_t + b_3 DLPD_t + b_4 L(PXG - PD)_{t-1} \\ & + b_5 L((WPXG * r / r_0) - PD)_{t-1} + e_t, \end{aligned} \tag{C.4}$$

where e_t is the error term and all other variables are as previously defined. A similar process is used to test price homogeneity in the import-price equation and to establish estimates of A_2, the pass-through coefficient of world prices into import prices.

In each case, the models are estimated using quarterly data from 1981:Q2 to 1995:Q3. For Italy, the sample stops in 1993:Q3. The relatively short data period means that no additional lags of the change in the variables are used. The definition of the data used in the estimation can be found in appendix D. The estimation included centered seasonal dummies. In the case of the export price equations for the United States and Germany, it is also necessary to include a dummy variable to account for a particularly large outlier. For export prices, two dummy variables are needed for the estimation for France and the United Kingdom. These dummy variables are for 1988:Q3 (*D*883) for the United States, 1993:Q1 (*D*931) for Germany, 1993:Q3 (*D*933) and 1994:Q1 (*D*941) for France, and 1986:Q1 (*D*861) and 1993:Q1 (*D*931) for the United Kingdom. For France and the United Kingdom, dummy variables are also needed for import prices. These are 1986:Q2 (*D*862) and 1995:Q1 (*D*951), respectively. A summary of the estimation results for the parameters of interest are presented in table C.5. Table C.5 shows the unconstrained long-term estimate of B_2 (given by b_5/b_4 from equation C.2), a test of homogeneity (given by the t-statistic on the parameter b_6 from equation C.3), and the long-term estimate of B_2 from equation C.4. Table C.5 also includes the equivalent information for the coefficient A_2 in the import-price equation. In each case, the parameters chosen are presented in table 4.5.

For export prices, homogeneity can be accepted for all countries except Japan and the United Kingdom. However, the resulting parameter estimates from the constrained estimation for both countries produce more sensible results than the unconstrained estimates. Furthermore, for Japan the constrained estimate is very close to the estimated coefficient on foreign prices (in yen) of 0.15 in the Japanese export-price equation reported in Hooper and Marquez (1995). Therefore, the constrained estimates of B_2 are used for the FEER simulations for all countries except Canada. In the case of Canada, no sensible results are available and, therefore, a coefficient of 0.5 is imposed (see chapter 4).

For import prices, homogeneity is accepted for all countries except the United States and Japan. Therefore, for Germany, the United Kingdom, Italy, and France the constrained estimates of A_2 are chosen as the parameter values. For Canada, the estimation did not yield sensible results. Thus, a value of 0.5 is imposed. For the United States, both the constrained and the unconstrained estimates of A_2 are quite close to each other, but they are much lower than the coefficient of 0.55 reported in Hooper and Marquez (1995) and much lower than the estimates of A_2 for the four economies where sensible estimates are forthcoming. Therefore, the chosen estimate of A_2 for the United States is taken from Hooper and Marquez (1995). For Japan, the estimated import-price equations do not produce sensible values. The unconstrained estimate of A_2 is undermined by a long-term coefficient of 2.452 on domestic prices in the import-price equation. Similarly, the constrained estimate of A_2 is greater than unity

Table C.5 Estimates of A_2 and B_2: the impact of world prices on trade prices

	Export prices			Import prices		
	Unconstrained B_2	Test of homogeneity	Constrained B_2	Unconstrained A_2	Test of homogeneity	Constrained A_2
United States	0.220	−1.704	0.194	0.245	−2.706	0.162
Japan	−0.429	4.359	0.159	0.458	2.074	1.487
Germany	0.650	0.099	0.606	0.675	−0.025	0.692
United Kingdom	1.34	3.282	0.71	0.87	1.793	0.75
France	0.39	−0.544	0.41	0.78	−0.985	0.86
Italy	0.29	−1.193	0.34	0.83	−0.416	0.87
Canada	−0.24	−1.807	−0.55	−1.14	−1.101	−4.21

and, therefore, would not make a sensible estimate of the long-term pass-through coefficient. Consequently, we chose a value of 0.78, which corresponds to the coefficient on foreign labor costs (in yen) in the import-price equation reported in Hooper and Marquez (1995).

Net Assets, IPD Flows, and Net Transfers

To complete the model of external assets and liabilities given in equations B.19 and B.20, we made several assumptions. First, we determined the best way to allocate the current account between the change in gross assets and gross liabilities. For simplicity, α is set to one half for all countries. We also made an assumption about the form of the constant, k. Although the current account identity provides the change in net external assets in every period, it does not completely determine the change in the individual asset stocks. In practice, external assets and liabilities will grow by more than just their proportion of the change in the current account. This factor is accounted for by including k. To ensure that the current account identity holds, k is set to be equal for both assets and liabilities. However, if k does not grow over time, then these asset stocks will increase at an ever declining rate. Therefore, equations B.19 and B.20 allow k to grow by a constant rate, y (which is expressed as a proportion), over time. The quarter on quarter growth rate, y, is set to 0.0074 for every country analyzed—equivalent to an annual rate of 0.03.

The choice of k for each country is a check of how sensible the model is in practice. If we compare the actual data for external assets and liabilities and the estimated data, it is possible to use equations B.19 and B.20 to forecast forward or backward. As the period of interest for the current analysis is the most recent one, the equations are used to create quarterly estimates of external assets and liabilities by taking the most recently available data point and backcasting.[6] In each case, we choose the constant to minimize the resulting discrepancy between the actual and implied data (judged by the sum of the absolute deviations of assets and liabilities from their actual values over the whole range of comparison, as well as the same value for the earliest point for which data is available). As the data for external assets and liabilities (see appendix D) are only available on an annual basis, this comparison can only be performed for one observation every year. The FEER simulations need quarterly data; therefore, it is this, rather than annual data, which is of interest. To calculate the constant on a quarterly basis, the actual year-end data is set to be the fourth-quarter observation every year. The discrepancy between the actual and implied data is then based on each fourth-quarter observation,

6. Within the FEER simulations the model is forecast forward. It uses the value of external assets and liabilities in the fourth quarter of 1994 to provide an initial value.

Table C.6 Parameters for net assets, IPD flows, and net transfers

	United States	Japan	Germany	United Kingdom	France	Italy	Canada
Constant for net assets, *k*	24	4300	19	18.3	94	8900	6.6
n_0	−10.023	295.294	−11.308	−1.147	−9.464	−324.095	−0.500
	(−14.82)	(2.53)	(−10.62)	(−11.33)	(−9.66)	(−0.61)	(−1.74)
n_1	−0.001	77.35	−0.100	−0.008	−0.001	−73.601	0.019
	(−0.05)	(7.87)	(−3.25)	(−2.83)	(−0.04)	(−4.75)	(2.30)
Split trend		*T*862					
		−64.497					
		(−4.77)					
Dummies	*D*911	*D*911	*D*911				
	*D*912						

Note: T-statistics are given in parentheses.

with the implied data being calculated on a quarter by quarter basis. Table C.6 presents the values of *k* chosen for each country, with the discrepancies in size reflecting the fact that *k* is valued in domestic currency.

Table C.6 also shows the estimates of n_0 and n_1 from the estimates of equation B.18.[7] These are estimates of the constant and the time trend, respectively, for net transfers. Net transfers can be highly seasonal. In addition, they are subject to sharp spikes, such as those experienced by the United States because of payments by its allies for its efforts in the Gulf War. Therefore, if actual net transfers are used, the FEER will fluctuate, because once net transfers are subtracted the trade balance necessary to reach the medium-term current account assumption will have an enforced seasonal pattern.

The dependent variable in this regression is cast in real terms, in domestic currency, and is modeled as a straight trend over time. In addition to this trend, a split trend (*T*862) is included for Japan, which takes the value of –35 before 1986:Q2 and that of the time trend thereafter.[8] The sample period for the estimates is 1980:Q1 to 1995:Q3 for the United States, Germany, Italy, and Canada; 1980:Q1 to 1995:Q2 for France and the United Kingdom; and 1981:Q1 to 1995:Q2 for Japan. In estimation, dummies are included to account for abnormal spikes in net transfers, such as those caused by the Gulf War. For the United States, Germany, and Japan

7. As stated in appendix B, the dependent variable in this equation includes a residual calculated as the difference between the actual current account and the totals of the trade, IPD, and net transfer flows. This residual arises because of the way the current account is modeled in the FEER analysis and the way the data are used. It is included here to ensure that this data discrepancy does not produce any systematic bias. However, for France and the United Kingdom, data peculiarities mean that the dependent variable in the estimation of n_0 and n_1 is just net transfers. In the simulations for Italy and Canada, net transfers and the residual are set to zero over the forecast period.

8. This is because the time trend is constructed so that it takes the value of zero in 1995:1.

a dummy (*D*911) (which is zero for all periods except 1991:Q1, when it takes the value of one) is necessary to account for this Gulf War factor. For the United States, an additional dummy for 1991:Q2 (*D*912) is also necessary. Centered seasonal dummies are included in the regression to eliminate any bias in the constant and trend. However, both the dummies and the centered seasonals are omitted in the equation used to obtain trend net transfers for the FEER simulations. The coefficients on the dummies and the centered seasonals have, therefore, been omitted from table C.6 in the interests of clarity.