On Deficits and Unemployment

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Abstract

Between 2007 and 2011 unemployment rose substantially in most European countries. During the same period a number of European countries experienced large declines in their external deficits. We use a general equilibrium, thirty-four country Ricardian model with potential wage inflexibility to explore the relationships among external adjustment, relative GDP, and unemployment over this period. Our analysis provides a decomposition between how increased unemployment and relative wage declines bore the burden of adjustment to a lower external deficit. Where unemployment played the larger role, declines in nominal GDP were more fully reflected in real GDP.

1 Introduction

Unemployment in some European countries has reached levels not seen since the Great Depression. Table 1 reports unemployment rates for 2007 and 2011 for 34 countries. Note that in 2007 only Poland and Turkey had rates exceeding 10 percent. In 2011 Poland was joined, among members of the European Union, by Estonia, Greece, Hungary, Ireland, Portugal, the Slovak Republic, Slovenia, and Spain, while Turkey's fell to just under 10 percent.

These labor market outcomes coincide with sizeable corrections in external deficits. Figure 1 reports, for the countries appearing in Table 1, a country's 2007 current account deficit (on the horizontal axis) and the subsequent change, between 2007 and 2011, in its deficit in manufactures (on the vertical axis), both as shares of the country's 2007 GDP. Note how a higher current account deficit in 2007 is associated with a larger decline in the deficit in manufactures over the subsequent 4 years. The five countries with current account deficits of 10 percent of GDP or more (Iceland, Estonia, Greece, Portugal, and Spain) had subsequent declines in their manufacturing trade deficits ranging from around 4 percent of GDP to over 15 percent.

What kind of other macroeconomic adjustments were associated with these large changes in trade deficits? Figure 2 shows that larger declines in the manufacturing trade deficit (now on the horizontal axis) tended to come with larger declines in GDP (on the vertical), as measured by the ratio of 2011 GDP to 2007 GDP. Figure 3 shows that larger declines in the manufacturing trade deficits (still on the horizontal axis) were also systematically associated with larger increases in the unemployment rate.[1] Together Figures 2 and 3 raise

[1] As discussed further below, we measure values such as national GDP or deficits relative to world GDP that year. But the relationships in Figures 1,2, and 3 look almost identical if we simply use current dollar

the question of how changes in GDP relate to changes in unemployment, i.e., Okun's Law. Following Okun (1962) and regressing the percentage change in GDP against the percentage point change in the unemployment rate delivers a slope of -2.4 in this cross section of countries.[2]

We use a simple multicountry Ricardian model to interpret the interaction among deficit adjustment, GDP, and employment. We build on Dekle, Eaton, and Kortum (2007, henceforth DEK), who used such a model to ask about the size of relative wage adjustments needed to move from the world of 2004 to a counterfactual world with no current account deficits. DEK assumed that relative wages were perfectly flexible (through any combination of nominal wage flexibility and exchange rate flexibility). Their finding was, in keeping with Figure 2, that closing deficits worldwide required countries with larger deficits to shrink in terms of their relative GDP's.

The model is about the interaction between the relative economic size of countries and imbalance in their trading relationships. What is consequently relevant to a country's scale is its share in world demand for traded goods. Thus nominal rather than real GDP's and exchange rates matter. Accordingly, the data reported above simply translate local currency GDP into U.S. dollars at the current nominal exchange rate. We sum U.S. dollar GDP's across countries to get world GDP. Because of the prevalence of nontraded goods, real magnitudes, which take into account local prices, may move very differently, as explored in DEK and in Dekle, Eaton, and Kortum (2008), and as we show below.

Instead of exploring DEK's counterfactual world with no deficits, here we look at what happened to the actual world in the turbulent period between 2007 and 2011. We start

values. The dollar value of world GDP increased 25 percent from 2007 to 2011.

[2]If we drop China the slope is close to two, in line with what Ball, Leigh, and Loungani (2012) estimate using time series from the United States and other advanced economies.

with the world of 2007, taking as given GDP's, trade flows, and deficits at the time. We then imagine how this world would have adjusted to accommodate deficits as they were in 2011, with no other exogenous changes.

Our first finding is that, if we follow DEK and allow relative wages to adjust to maintain full employment, we can capture qualitatively the connection between the declines in manufacturing trade deficits and the declines in relative GDP portrayed in Figure 2. Given our parameterization, however, the declines predicted by our model are mostly more modest than those in the data. In other words, the version of Figure 2 created by the neoclassical version of DEK has a slope of the right sign, but is too flat.

We then introduce a radical departure from DEK. We ask what would have happened if there was no flexibility in relative wages, with unemployment bearing the full burden of adjustment to the 2011 deficits, allowing for only downward adjustment in employment. This radically Keynesian version of DEK captures not only the sign of the slope in Figure 2, but its magnitude as well. Moreover, the exercise predicts that unemployment rises more where it did rise more. The problem here is that it predicts much larger changes in unemployment than actually occurred. In other words, the radically Keynesian version of DEK gets Figure 2 about right, but its version of Figure 3 is way too steep.

An explanation for this overprediction is that some relative wage adjustment did occur, just not enough to maintain full employment. Our final exercise is to ask what relative wage changes would be needed for the model to get Figure 3 just right, that is, to deliver exactly the changes in unemployment that appear in the data. The answer is that the wage changes required would be fairly modest, and the combined effect of these wage changes with the actual employment changes imply changes in GDP's similar to those that actually occurred. That is, this hybrid version of DEK, like the radically Keynesian one, is able to

mimic Figure 2 while capturing Figure 3 exactly (the second by construction).

2 A Model

Our analytic framework builds on existing Ricardian models of international trade, particularly Eaton and Kortum (2002, henceforth, EK), Alvarez and Lucas (2007), and, most directly, DEK. There are N countries indexed by i. Country i has a measure L_i of workers who can do various activities in that country but not elsewhere.

There are two types of goods, manufactures M and nonmanufactures N. Nonmanufactures are very simple, with one worker producing one unit of output. We do not model trade in nonmanufactures but allow for nonmanufacturing deficits as they appear in the data. Manufactures consist of a unit continuum of differentiated goods indexed by j. Production of a manufactured good requires a Cobb-Douglas combination of labor services, with share β, and intermediates. Intermediates are themselves a constant elasticity of substitution (CES) aggregate, with elasticity σ, of the unit continuum of manufactures. We denote country i's efficiency in producing good j as $z_i(j)$, which we treat as the realization of a random variable drawn from the distribution:

$$\Pr[Z \leq z] = e^{-T_i z^{-\theta}}$$

where $T_i > 0$ and $\theta > 1$ are parameters. Exporting a manufactured good entails a standard iceberg trade cost, so that delivering a unit of a good from country i to country n requires the effort to produce $d_{ni} > 1$ units.

Preferences are Cobb Douglas in M and N, with M having a share α. Preferences for the individual manufactured goods are CES also with elasticity of substitution σ. Competition is perfect.

To these very standard assumptions we follow DEK and introduce exogenous deficits, with country i having an overall deficit D_i and a manufacturing trade deficit D_i^M, where we require:

$$\sum_{i=1}^{N} D_i = \sum_{i=1}^{N} D_i^M = 0.$$

2.1 Single-Period Equilibrium

Given parameter values we can solve the model for a set of national-level wages w_i that fully employ labor in each country. Income in each country will then be $Y_i = w_i L_i$ and final expenditure $X_i = Y_i + D_i$. Total expenditure on manufactures by country i, X_i^M, is the sum of final and intermediate demand and also the sum of manufacturing production Y_i^M and the manufacturing deficit. Thus:

$$(1) \quad X_i^M = \alpha X_i + (1-\beta) Y_i^M = Y_i^M + D_i^M.$$

As shown in EK (2002), our assumptions imply that the manufacturing price index in country n, p_n, is:

$$(2) \quad p_n = \gamma \left[\sum_{i=1}^{N} T_i (w_i^{\beta} p_i^{1-\beta} d_{ni})^{-\theta} \right]^{-1/\theta},$$

where γ is a term that depends on only σ and θ.[3] The share of country i in country n's purchases of manufactures is:

$$(3) \quad \pi_{ni} = \frac{T_i (w_i^{\beta} p_i^{1-\beta} d_{ni})^{-\theta}}{\sum_{k=1}^{N} T_k (w_k^{\beta} p_k^{1-\beta} d_{nk})^{-\theta}},$$

[3] Specifically,

$$\gamma = \left[\Gamma \left(\frac{\theta - (\sigma - 1)}{\theta} \right) \right]^{-1/(\sigma-1)}$$

where Γ is the complete gamma function.

which, using (2), we can write more simply as:

$$(4) \quad \pi_{ni} = T_i \left(\frac{w_i^{\beta} p_i^{1-\beta} d_{ni}}{p_n/\gamma} \right)^{-\theta}.$$

Equilibrium in the market for the manufactures of country i implies that:

$$(5) \quad Y_i^M = \sum_{n=1}^{N} \pi_{ni} X_n^M,$$

We can solve (1) to get:

$$(6) \quad Y_i^M = \frac{\alpha}{\beta} \left[Y_i + D_i - \frac{1}{\alpha} D_i^M \right].$$

and add D_n^M to get:

$$(7) \quad X_n^M = \frac{\alpha}{\beta} \left[Y_n + D_n - \frac{1-\beta}{\alpha} D_n^M \right].$$

Substituting manufacturing supply (6) and manufacturing demand (7) into the goods market clearing conditions (5) we get:

$$(8) \quad w_i L_i + D_i - \frac{1}{\alpha} D_i^M = \sum_{n=1}^{N} \pi_{ni} \left[w_n L_n + D_n - \frac{1-\beta}{\alpha} D_n^M \right].$$

Taking as given (i) the trade imbalances D_i and D_i^M, (ii) labor supplies L_i, (iii) the technology parameters T_i, (iv) trade costs d_{ni}, and (v) parameters α, β, and θ, a full-employment equilibrium is a set of wages w_i and prices p_i that satisfy (2) and (8), with π_{ni} given by (4).

2.2 External Adjustment

Our first exercise, following DEK, is to ask what would happen to endogenous variables w_i and p_i if we perturb the 2007 equilibrium only by substituting the 2011 deficits for the

2007 ones. We denote the 2007 value of variable x and its 2011 value in our exercise as x', with the change in its value given by $\widehat{x} = x'/x$.

Our analysis adds to DEK (2007) by allowing for the possibility that employment, as well as wages, adjust. Together, the post-adjustment wages, prices, and employment must satisfy the market-clearing condition:

$$w_i' L_i' + D_i' - \frac{1}{\alpha} D_i^{M\prime} = \sum_{n=1}^{N} \frac{T_i (w_i')^{-\theta\beta} (p_i')^{-\theta(1-\beta)} d_{ni}^{-\theta}}{\sum_{k=1}^{N} T_k (w_k')^{-\theta\beta} (p_k')^{-\theta(1-\beta)} d_{nk}^{-\theta}} \left(w_n' L_n' + D_n' - \frac{1-\beta}{\alpha} D_n^{M\prime} \right).$$

and the price equation:

$$p_n' = \gamma \left\{ \sum_{i=1}^{N} T_i \left[(w_i')^{\beta} (p_i')^{1-\beta} d_{ni} \right]^{-\theta} \right\}^{-1/\theta}.$$

After some manipulation, these two sets of equations can be rewritten as:

$$(9) \quad \widehat{w}_i \widehat{L}_i Y_i + D_i' - \frac{1}{\alpha} D_i^{M\prime} = \sum_{n=1}^{N} \frac{\pi_{ni} \left(\widehat{w}_i^{\beta} \widehat{p}_i^{(1-\beta)} \right)^{-\theta}}{\sum_{k=1}^{N} \pi_{nk} \left(\widehat{w}_k^{\beta} \widehat{p}_k^{(1-\beta)} \right)^{-\theta}} \left(\widehat{w}_n \widehat{L}_n Y_n + D_n' - \frac{1-\beta}{\alpha} D_n^{M\prime} \right)$$

and:

$$(10) \quad \widehat{p}_n = \left(\sum_{k=1}^{N} \pi_{nk} \left(\widehat{w}_k^{\beta} \widehat{p}_k^{(1-\beta)} \right)^{-\theta} \right)^{-1/\theta}.$$

Equations (9) and (10) constitute a system of $2N$ equations in the $3N$ unknowns $\widehat{w}_i$, $\widehat{L}_i$, and $\widehat{p}_n$. The knowns of the equations are the baseline (that is, 2007) levels of GDP Y_i, and the baseline (i.e., 2007) trade shares π_{ni}, the new (2011) deficits D_i' and $D_i^{M\prime}$, and the parameters α, β, and θ.

DEK assumed that all the w_i's adjusted to maintain $\widehat{L}_i = 1$. (By Walras' Law, of course, only $N - 1$ relative wages need to adjust.) We do that here as well to see the extent of wage adjustment that the model says would be needed to accommodate the adjustments in the deficits.

Here we allow employment to adjust as well. One exercise is to feed in actual changes in unemployment and ask what wage changes are needed given the unemployment changes that occurred.

Another is to introduce wage stickiness, and ask what changes in employment would have been needed to accommodate the new deficits. We do so by introducing into the model blocs of countries whose wages are tied together. A reason might be that they share a currency or tie their currencies to each other, and nominal wages are rigid. For any bloc $b \in B$, for all countries in that bloc (i.e., for all countries $i \in b$), wages move together, so that $\widehat{w}_i = \widehat{w}_b$. We then allow employment to fall, i.e., $\widehat{L}_i \leq 1$. We allow $\widehat{w}_b$ itself to move to the extent necessary to maintain full employment in the bloc member requiring the least adjustment. Hence for each bloc b there is a country $i \in b$ such that $\widehat{L}_i = 1$. We treat any country with a flexible exchange rate as a trivial bloc with only one member. Hence it maintains full employment in the adjustment. But members of nontrivial blocs can experience employment declines. If each country is its own bloc we simply replicate the exercise in DEK. At the other extreme we can assume global inflexibility and treat the world as a single bloc.

3 A Two-Country Example

Before turning to our 34 country quantitative exercises below, it's useful to examine the forces at work in a simple two-country example. With two countries the model becomes a special case of the classic model of Dornbusch, Fischer, and Samuelson (1977). Let's label our countries S (for southern Europe) and N (for northern Europe) and imagine that S had a deficit D with N, all in manufactures, which has to be eliminated, so that $D' = 0$.

To simplify further let's get rid of intermediates and set $\beta = 1$ (For this exercise α doesn't matter.) Let's use the wage in N as numéraire so that $\widehat{w}_N = 1$. We can then write equation (9) as:

$$\frac{\pi_{NS} + \pi_{NN}\left(\widehat{w}_S\right)^{\theta}}{\pi_{SS}\left(\widehat{w}_S\right)^{-\theta} + \pi_{SN}} \frac{\widehat{w}_S \widehat{L}_S}{\widehat{L}_N} = \frac{\pi_{NS} Y_N}{\pi_{SN} Y_S}$$

(Without intermediates we can ignore equation (10) as price indices don't feed back into the market clearing conditions.)

As long as $\pi_{NS} + \pi_{SN} < 1$, which is guaranteed if transport costs are positive, the fact that S runs a deficit with N means that the right-hand side is less than one.[4] Hence adjustment in wages or employment requires that the left-hand side fall below one.

With full employment and perfect wage flexibility $\widehat{L}_N = \widehat{L}_S = 1$ and the expression becomes:

$$\frac{\pi_{NS} + \pi_{NN}\left(\widehat{w}_S\right)^{\theta}}{\pi_{SS}\left(\widehat{w}_S\right)^{-\theta} + \pi_{SN}} \widehat{w}_S = \frac{\pi_{NS} Y_N}{\pi_{SN} Y_S} \tag{11}$$

and balancing requires the $\widehat{w}_S$ that satisfies this expression. The left-hand side is increasing in $\widehat{w}_S$ with an elasticity that exceeds 1 and, and is larger the higher θ. Hence adjustment requires $\widehat{w}_S < 1$, but the required decline is less that the ratio on the right-hand side.

With wage inflexibility ($\widehat{w}_S = 1$) N will remain at full employment ($\widehat{L}_N = 1$) with the

[4] The deficit D solves:

$$D = \pi_{SN}(Y_S + D) - \pi_{NS}(Y_N - D)$$

implying that:

$$\frac{\pi_{NS} Y_N}{\pi_{SN} Y_S} = 1 - \frac{(1 - \pi_{SN} - \pi_{NS})D}{\pi_{SN} Y_S} < 1$$

under the restriction that $\pi_{SN} + \pi_{NS} < 1$.

adjustment in $\widehat{L}_S$ given by:

$$(12) \quad \widehat{L}_S = \frac{\pi_{NS} Y_N}{\pi_{SN} Y_S}.$$

The magnitude of the adjustment $\widehat{L}_S$ under wage stickiness exceeds the adjustment $\widehat{w}_S$ under wage flexibility. As a consequence S suffers a larger decline in its GDP relative to N's when employment rather than wages bear the burden of adjustment.

The reason for the greater magnitude required in $\widehat{L}_S$ versus $\widehat{w}_S$ can be understood in terms of Johnson's (1958) venerable distinction between expenditure-reducing and expenditure-switching policies to correct a deficit. Either adjustment works to the same degree to reduce expenditure in S relative to N, through $\widehat{w}_S$ appearing outside the fraction on the left-hand side of (11) and through $\widehat{L}_S$ appearing on the left-hand side of (12). But $\widehat{w}_S$ has two additional expenditure-switching effects, as it leads each country to switch its spending away from N toward S. How these effects operate is through how $\widehat{w}_S$ enters in two places inside the fraction on the left-hand side of (11).

We put this two-country example to work to get some sense of the magnitudes of adjustment involved. Imagine that the Euro zone constitutes the entire world and assign countries to N or to S depending on whether their overall trade balance in 2007 was in surplus or deficit.[5] Based on the data from Table 1 this exercise generates an N with a 2007 GDP of US$5.5 trillion and an S with a 2007 GDP of 6.8 trillion. The overall trade surplus of N is (coincidently and conveniently for us) just slightly higher than the overall trade deficit of S. For our purposes we will put both numbers at US$ 0.3 trillion, which is in between N's surplus and S 's deficit. We assign N an import share from S of 0.2 requiring, given GDP's and the deficit, that we assign S an import share of around 0.21. Together

[5] Country N combines Austria, Belgium-Luxemburg, Finland, Germany, Ireland, and the Netherlands. Country S combines Estonia, France, Greece, Italy, Portugal, the Slovak Republic, Slovenia, and Spain.

these numbers imply that the right-hand side of equation (11) or (12) equals 0.78. An immediate implication of (12) is that, without any wage adjustment, we need $\widehat{L}_S = 0.78$, meaning that employment in S would have to fall by 22 percent to correct the deficit.

To gauge the relative wage change required forces us to take a stand on the value of θ. Following Eaton, Kortum, Neiman, and Romalis (2012) we use $\theta = 2$. Plugging these various numbers into (11) implies that we need $\widehat{w}_S = 0.94$. Hence the wage adjustment required is quite modest.

The results are from a very stylized exercise, but they point to how a deficit whose elimination would require only a relatively small change in relative wages would require large employment changes if relative wages aren't free to do the work.

4 Quantitative Implementation

We go beyond the example above in several directions. First, we look at actual changes in deficits from 2007 to 2011 and see how well the model can deliver the changes in GDP that actually occurred. Second, we use data from 34 countries (those listed in Table 1) taking into account their sizes and how much they trade with each other. We also reintroduce a nonmanufacturing sector (with a share α in final consumption) and intermediates (with a share $1 - \beta$ in manufacturing production). We set $\alpha = 1/3,\ \beta = 1/3$, and $\theta = 2$, similar to values used elsewhere. As in Alvarez and Lucas (2007), DEK, and the data described above, we use world GDP as numéraire, imposing the normalization:

$$\sum_{i=1}^{N} \widehat{w}_i \widehat{L}_i Y_i = 1.$$

4.1 Adjustment with Full Employment

We begin by revisiting DEK, asking what wage changes would have been needed to adjust to the new deficits. Figure 4 shows the results, plotting the changes in GDP delivered by the model, which in this case are simply the wage changes, against the changes in GDP that actually occurred.

The model qualitatively picks up the decline in GDP of the large deficit countries, with particularly large declines for Iceland, Greece and Estonia. It also picks up the small changes in GDP for the European countries that were not faced with external adjustment. It fails, however, to pick up the magnitude of the decline in Iceland. Conversely, it fails to pick up the decline in GDP in Ireland and the United Kingdom, which isn't surprising since these two countries did not experience serious external adjustment.[6]

4.2 Adjustment with Fixed Wages

We now perform the equivalent exercise in a world with no wage flexibility, and calculate the equilibrium in which only employment levels can adjust. Figure 5 portrays the analogous relationship between predicted and actual GDP changes as Figure 4. The results are similar except for a great improvement in the ability of the model to capture the magnitude of the declines in the countries requiring severe adjustment, in the case of Estonia actually overpredicting the decline in GDP required. The need for greater changes in GDP with only employment adjusting were foreshadowed in our two-country example above.

How do our model's predictions for changes in unemployment line up with what hap-

[6] Also not surprising is that our model, in which the need for external adjustment is the only reason for GDP to change, doesn't pick up the large increases in GDP in countries such as Australia and China, the second of which has been removed from these figures in order to limit the scale of the horizontal axis.

pened? Figure 6 portrays the results, showing a high correlation. But we predict increases in unemployment in the high adjustment countries that are much larger (sometimes by an order of magnitude) than what actually took place.

Our Okun's Law regression above foreshadowed this problem. Our radically Keynesian model implies an Okun coefficient of around -1 rather than the number closer to -2 that we estimated in the data. Hence we are requiring changes in GDP to be accompanied by changes in unemployment that are much larger than what we observe.

4.3 Hybrid Adjustment

To summarize our results so far, under full employment the changes in wages required for adjustment tend to be smaller than what we observe, while, under fixed wages the changes in unemployment are much greater than what we observe. Is there a combination of the two that can fix the facts?

A simple way to get at the answer is to feed the model the changes in employment implied by the changes in unemployment we observe in the data, delivering a set of $\widehat{L}_i$'s. Incorporating those we can solve for the $\widehat{w}_i$'s needed for adjustment. By construction we hit the changes in employment. Figure 7 reports how well this exercise performs in capturing the changes in GDP's. Note that we have not lost the ability of the radically Keynesian model to explain what happened.

Figure 8 plots the wage changes against the changes in GDP delivered by the exercise. Deviations indicate the contribution of changes in unemployment. The distance above the 45 degree lines constitutes the extent to which our model attributes the overall change in GDP to changes in unemployment. Ireland and Spain stand out as countries where increased unemployment was a major factor in the decline in GDP.

What does our analysis say changes in real GDP? Most goods and services are produced locally. As a consequence, when relative GDP changes correspond to changes in relative wages, most prices move in the same direction, substantially muting changes in real GDP. DEK and Dekle, Eaton, and Kortum (2008) found that the real GDP changes needed to eliminate 2004 deficits were much smaller than the corresponding nominal GDP changes.

When unemployment rather than wages adjust, however, there are no mitigating price changes, so that the effects on real GDP are much more severe. Figure 9 looks at what our hybrid adjustment exercise says about changes in real GDP, using the price changes implied by equation (10). The changes implied by the model for nominal GDP (the vertical axis in Figure 7) appear on the horizontal axis, with the corresponding real GDP changes on the vertical. Real GDP changes are distinctly smaller except for countries, such as Ireland and Spain, where increased unemployment was a major factor in the decline in nominal GDP.

5 Conclusion

Our analysis maps out general equilibrium, cross-country relationships among trade deficits, GDP, and unemployment. A great deal of territory remains uncharted. As our framework is static, we have no theory about why deficits changed as they did. Nor do we have a theory about how GDP changes decompose into wages and in employment. The insights that we do provide about variation in unemployment are based on external adjustment. Hence we don't explain the substantial rises in unemployment and declines in GDP in Ireland and the United Kingdom, where little external adjustment occurred.[7] Accounting

[7] While the two countries experienced similar declines in GDP, the decline in the United Kingdom was primarily in its relative wage while increased unemployment played a much greater role in Ireland.

for such phenomena in a general-equilibrium, multi-country framework poses a challenge.

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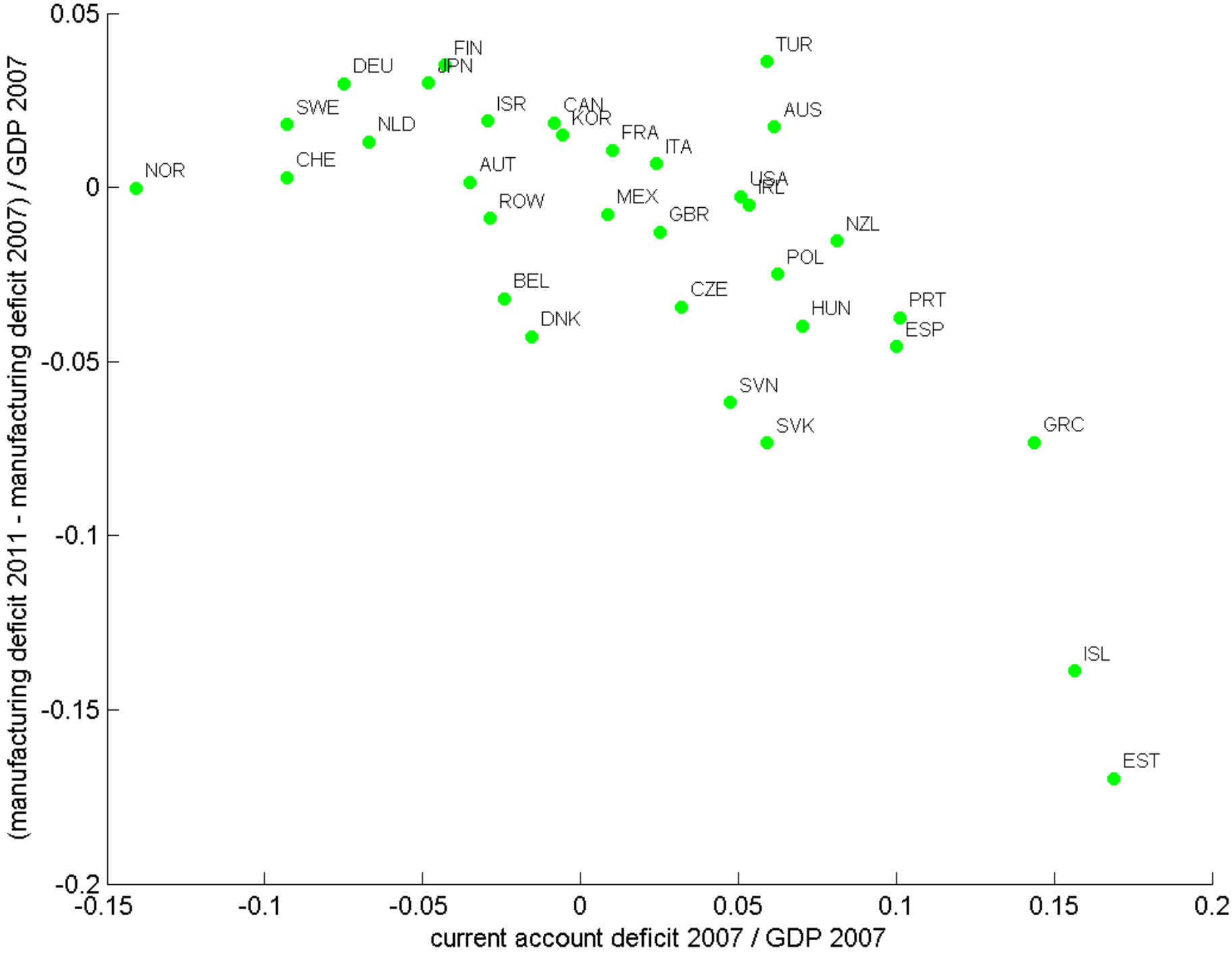
Table 1

Country	GDP ($ billions) 2007	Trade Deficit ($ billions) 2007	Unemployment Rate (percent) 2007	2011
Australia	945.6	29.0	4.4	5.1
Austria	375.6	-18.0	4.4	4.2
Belgium-Luxembourg	511.4	-27.9	7.3	7.0
Canada	1424.1	-9.4	6.1	7.5
China	3494.2	-262.7	5.7	6.5
Czech Republic	180.5	-2.5	6.6	8.5
Denmark	311.4	-3.1	3.6	6.0
Estonia	22.0	2.3	4.7	12.3
Finland	246.5	-9.5	6.9	7.8
France	2586.8	73.3	8.0	9.3
Germany	3328.6	-190.5	8.8	5.9
Greece	311.2	45.1	8.3	17.3
Hungary	136.1	0.5	7.3	10.9
Iceland	20.4	2.4	1.0	7.4
Ireland	260.3	-20.2	4.6	14.4
Israel	167.1	4.6	7.3	5.6
Italy	2130.2	32.5	6.1	8.4
Japan	4356.4	-18.0	3.8	4.6
Korea	1049.2	-2.5	3.3	3.4
Mexico	1035.3	29.6	3.7	5.2
Netherlands	783.7	-54.4	3.6	4.4
New Zealand	131.5	3.2	3.7	6.5
Norway	393.5	-48.8	2.5	3.3
Poland	425.3	17.6	12.7	12.4
Portugal	232.1	21.5	8.0	12.7
Slovak Republic	75.1	1.9	8.4	13.2
Slovenia	47.4	1.4	7.7	11.8
Spain	1443.5	115.5	8.3	21.6
Sweden	462.5	-28.5	6.1	7.5
Switzerland	434.1	-39.1	2.8	3.1
Turkey	649.1	41.5	10.3	9.8
United Kingdom	2813.9	121.3	5.3	8.1
United States	14028.7	892.1	4.6	8.9
ROW	10864.1	-700.3	-	-

Trade deficit is for total goods and services.

Figure 1: Initial Current Account Deficit and Change in Manufacturing Trade Deficit



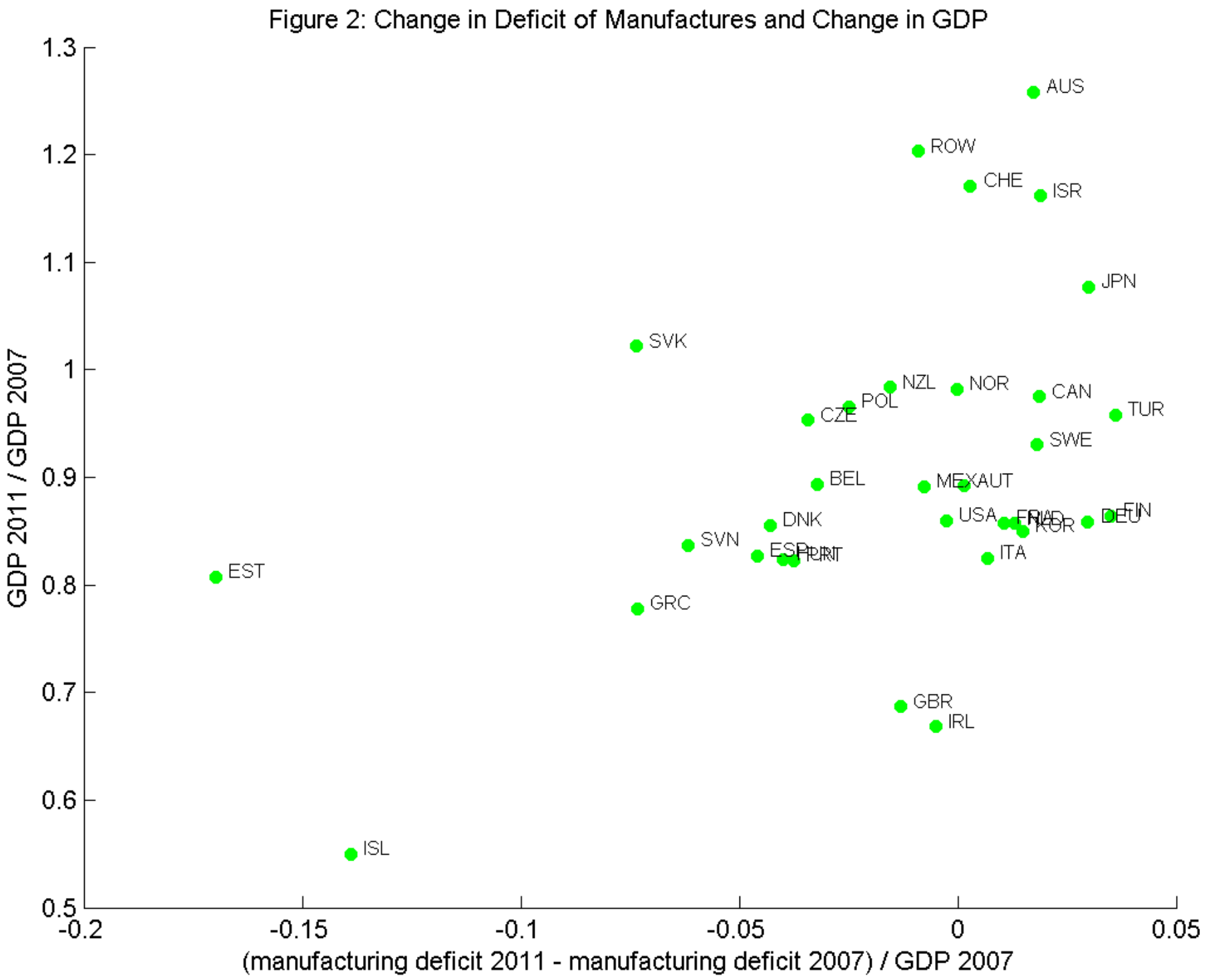


Figure 2: Change in Deficit of Manufactures and Change in GDP
GDP 2011 / GDP 2007
(manufacturing deficit 2011 - manufacturing deficit 2007) / GDP 2007
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
-0.2
-0.15
-0.1
-0.05
0
0.05
AUS
ROW
CHE
ISR
JPN
SVK
NZL
NOR
CAN
POL
TUR
CZE
SWE
BEL
MEX
AUT
USA
DNK
DEU
SVN
ITA
EST
GRC
GBR
IRL
ISL

Figure 3: Change in Deficit of Manufactures and Change in the Unemployment Rate

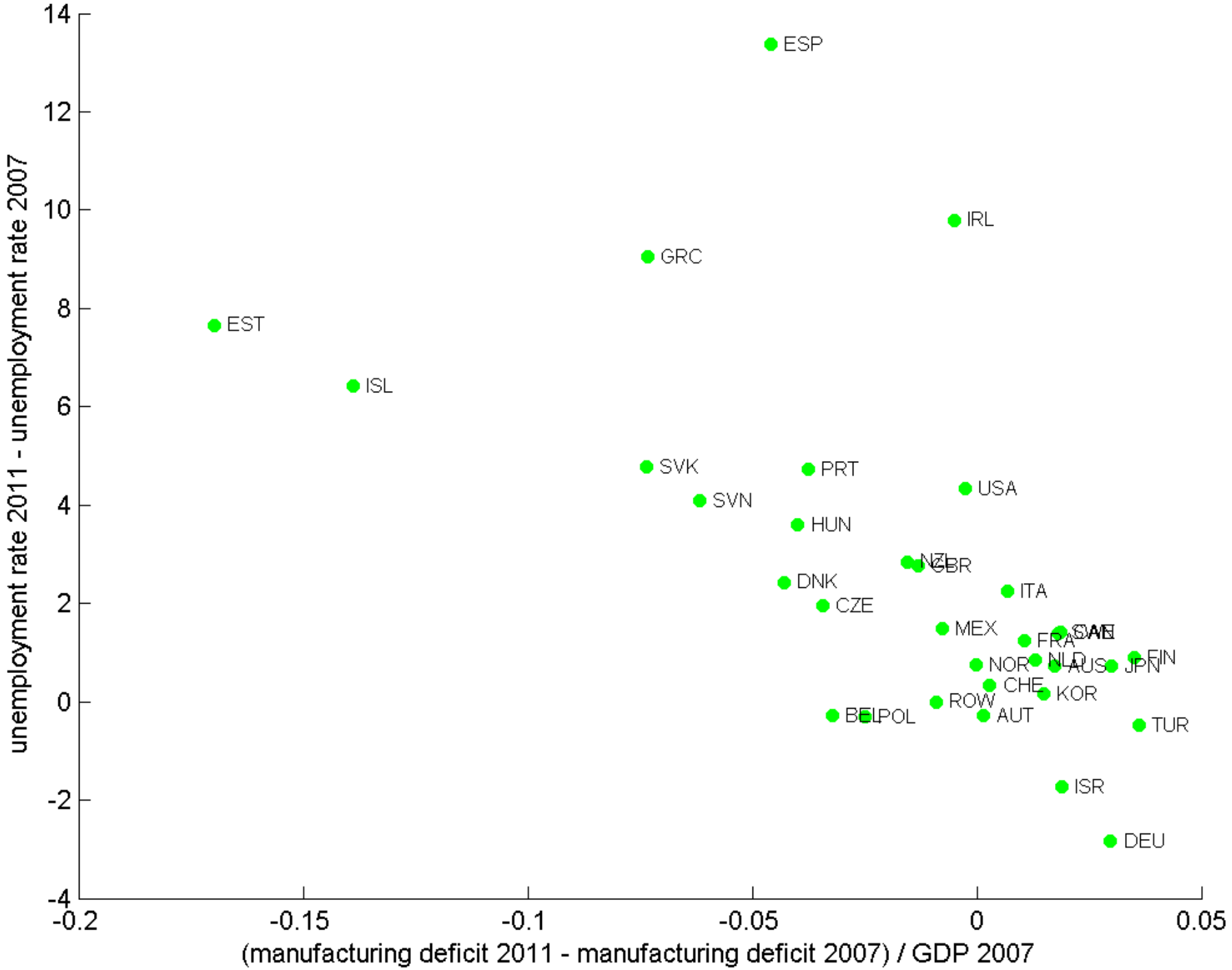


Figure 4: Actual and Predicted Change in GDP from Full-Employment Model

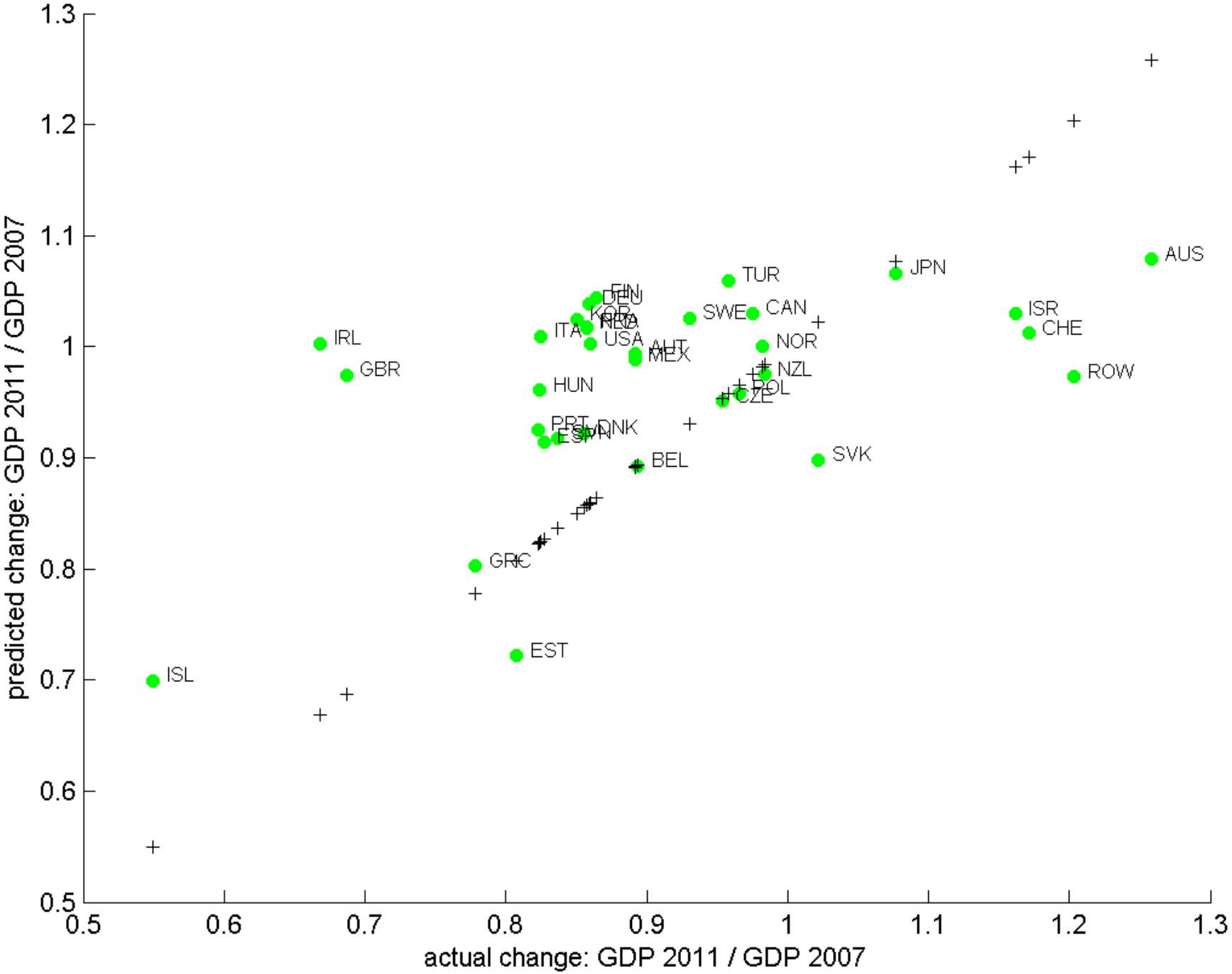


Figure 5: Actual and Predicted Change in GDP from Fixed-Wage Model

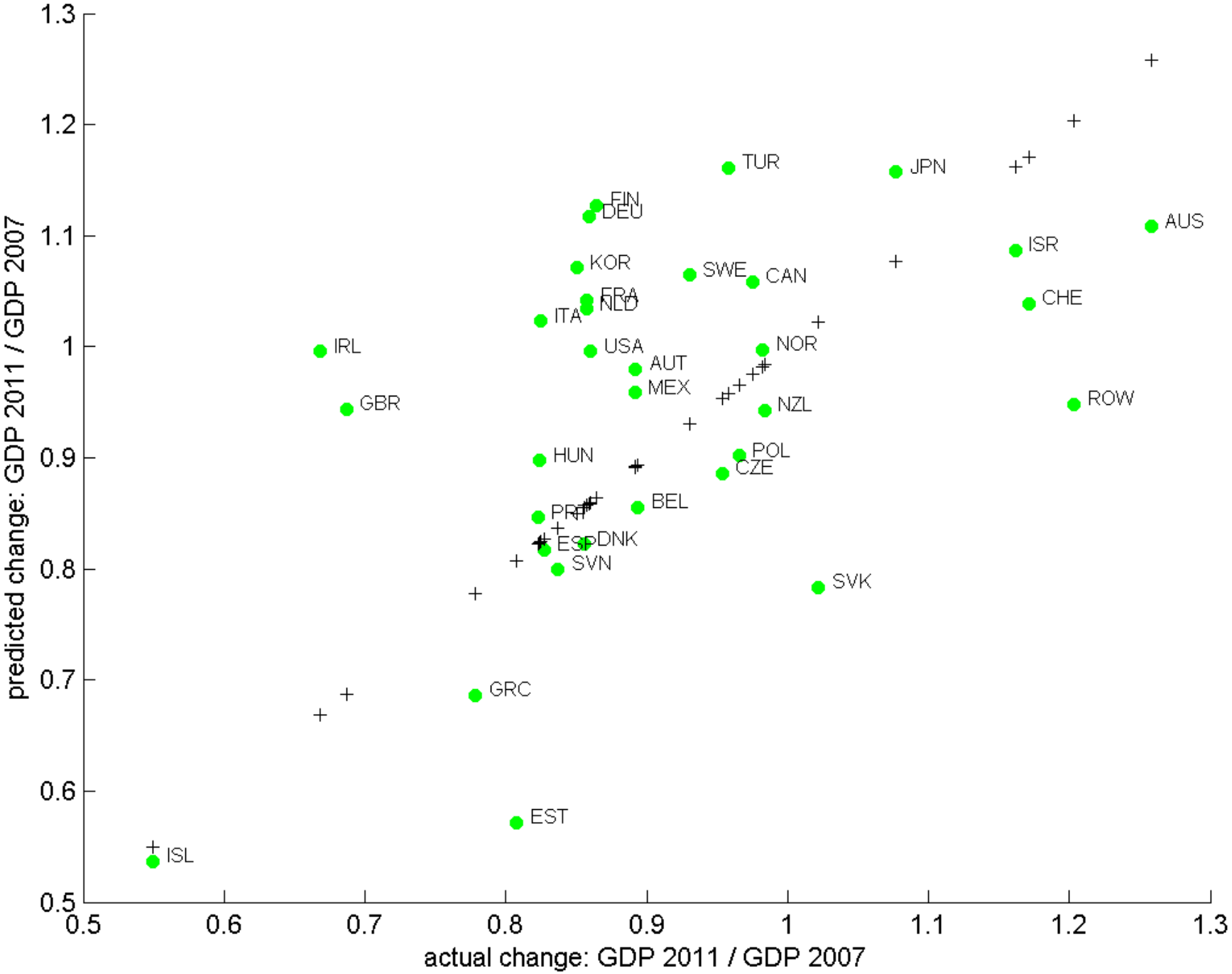


Figure 6: Actual and Predicted Change in Unemployment from Fixed-Wage Model

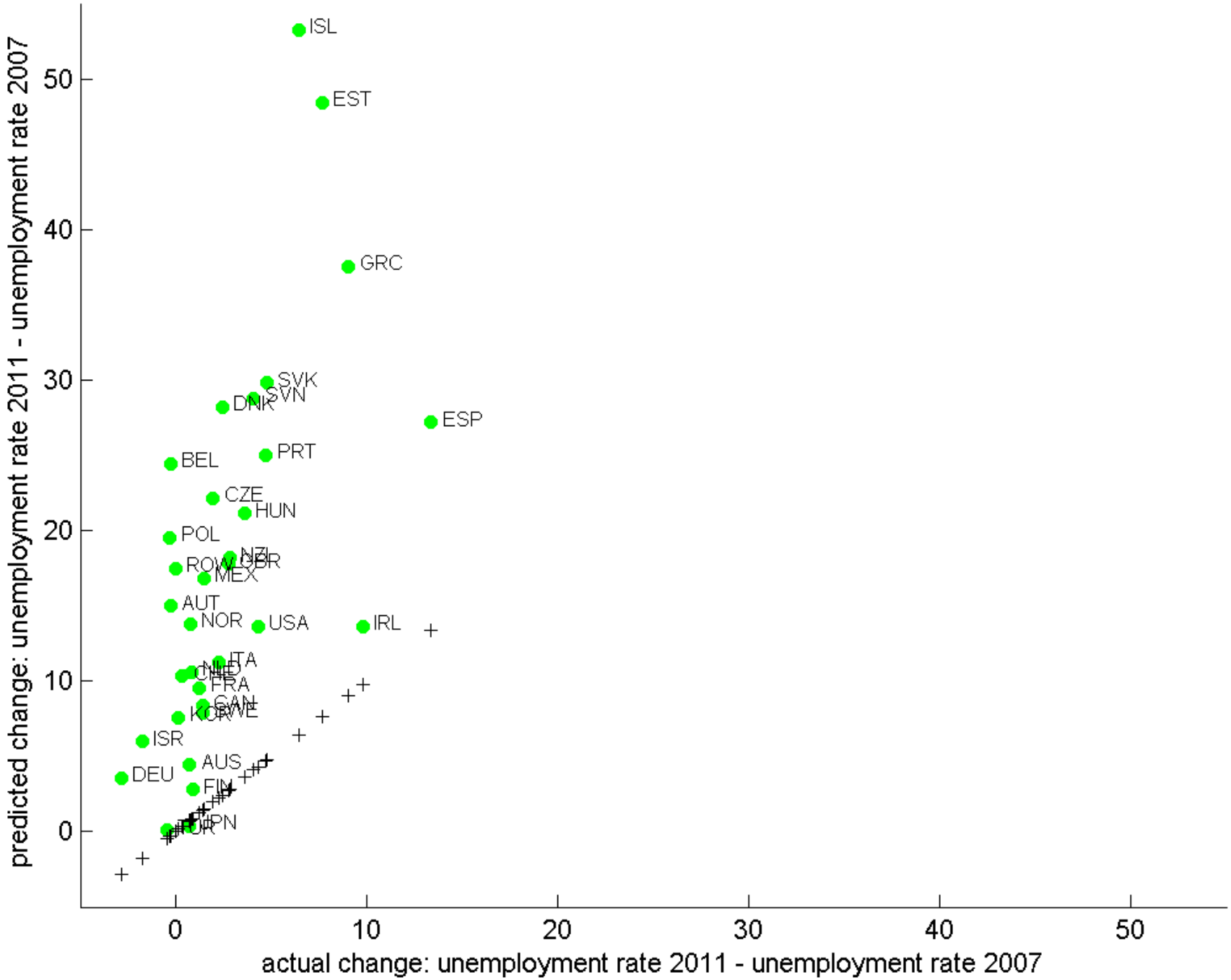


Figure 7: Actual and Predicted Change in GDP from Hybrid Model

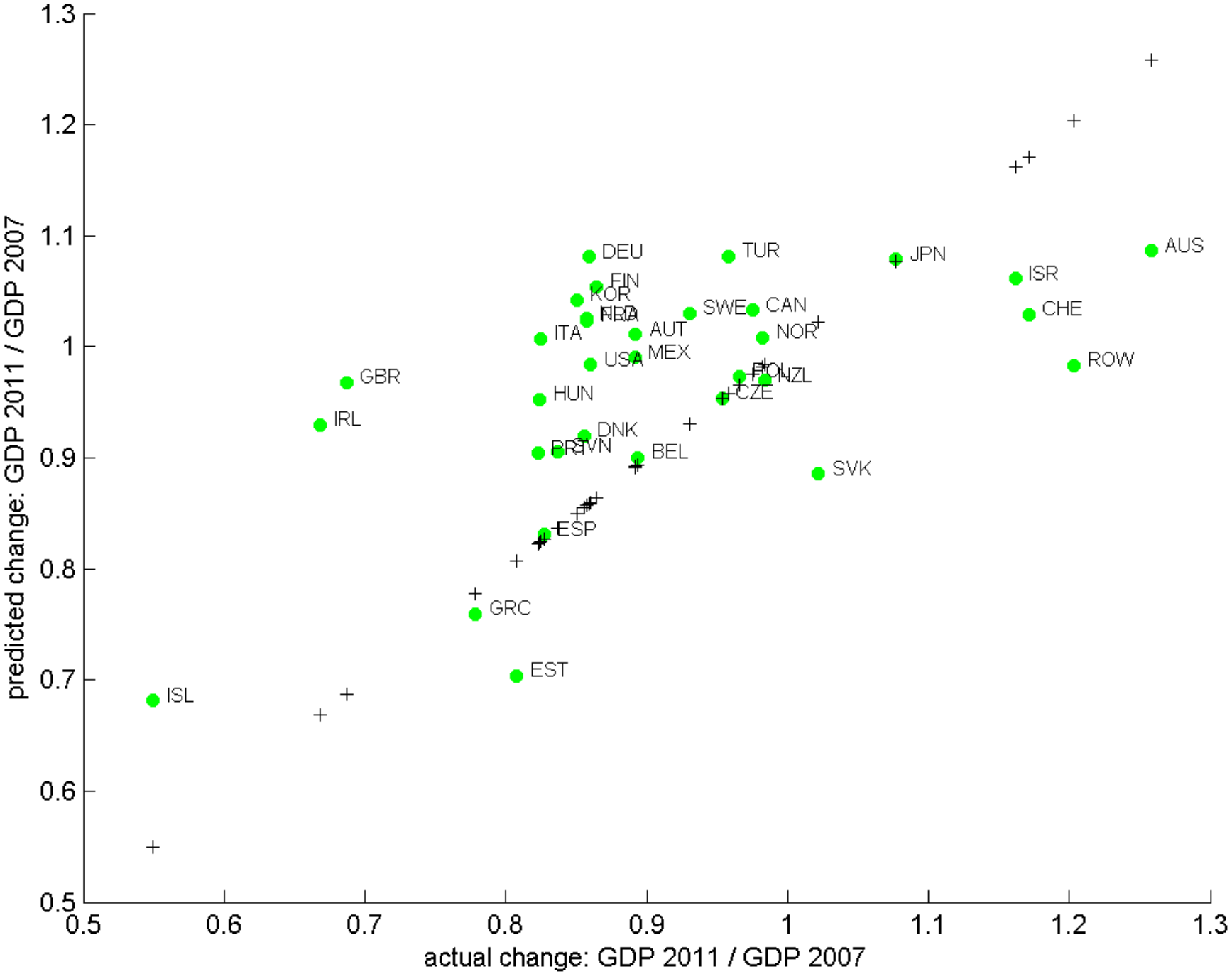


Figure 8: Predicted Change in GDP and Wage from Hybrid Model

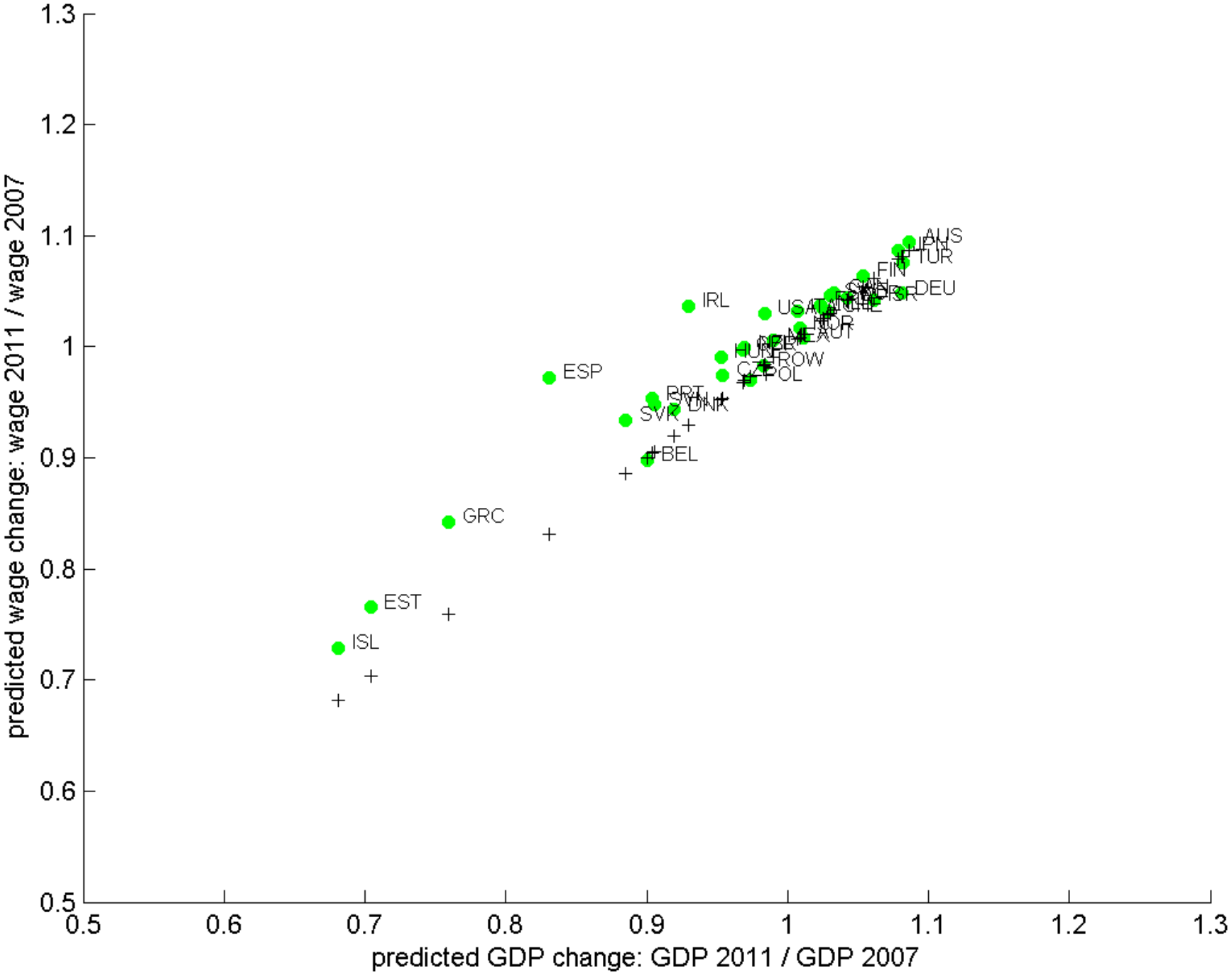


Figure 9: Predicted Change in GDP and Real GDP from Hybrid Model