SUGGESTIONS FOR HOME OFFICE PREDICTION OF BULGARIAN AND ROMANIAN WORK REGISTRATIONS

In 2003, the Immigration & Nationality Directorate branch of the Home Office published its now notorious prediction that the net immigration from the eight East European accession countries (AC8) would be between 5,000 and 13,000 a year. That the prediction turned out to be ludicrously small may be because it was based on irrelevant data — from years ago and from regions well outside Europe. But it may also be because, at that time, the Home Office was keen to extract a low, and therefore unalarming, prediction from the contracted academics. Three years later, the Home Office line is that immigration is good for Britain — to the tune of 2.5 billions a year.

The same welcome should therefore be extended to those who register for work in Britain from anywhere in Europe — whether they eventually return or decide to stay. Looking ahead to the accession of Bulgaria and Romania in 2007, the Home Office might now want to give the corresponding predictions an upward, rather than downward, gloss. This note explains how they could do that.

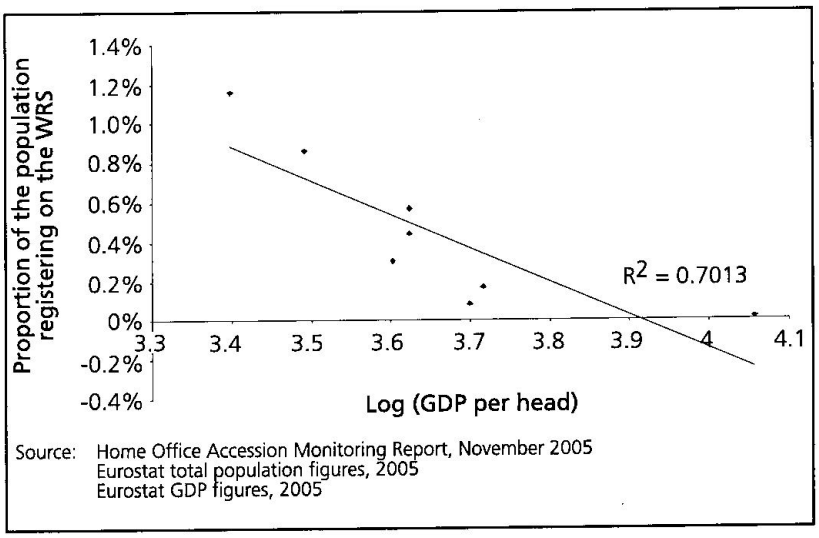
This time there *are* relevant data — the updated figures of cumulative work registrations up to the end of 2005 for the AC8 for the 20 months from Accession Day in May 2004. The following table gives the data on which the Home Office could formulate some reasonably scientific predictions of the missing numbers for Bulgaria and Romania.

Country	Population	Registrations	GDP(million euros)
Slovenia	1,997,600	340	27,373
Czech	10,220,600	20,005	98,417
Hungary	10,097,500	10,345	87,826
Estonia	1,347,000	4,680	10,540
Slovakia	5,384.800	36,355	37,301
Poland	38,173,800	204,895	240,540
Lithuania	3,425,300	44,715	20,587
Latvia	2,306,400	23,030	12,789
Romania	21,658,500	???	79,313
Bulgaria	7,761,000	???	21,448

The updated figures for home-country populations, work registrations and gross domestic product (GDP) are listed in decreasing order of GDP-per-head. The figures, from a variety of sources, have been left in the usual superficially precise form.

Government has already taken an interest in the first 17 months of data. In the Department for Work and Pension's Working Paper No. 29 entitled 'The Impact of free movement of workers from Central and Eastern Europe on the UK labour market', there is a graph (here reproduced) that shows a negative correlation between the number of work registrations and the home country's GDP, both taken per head of home country population.

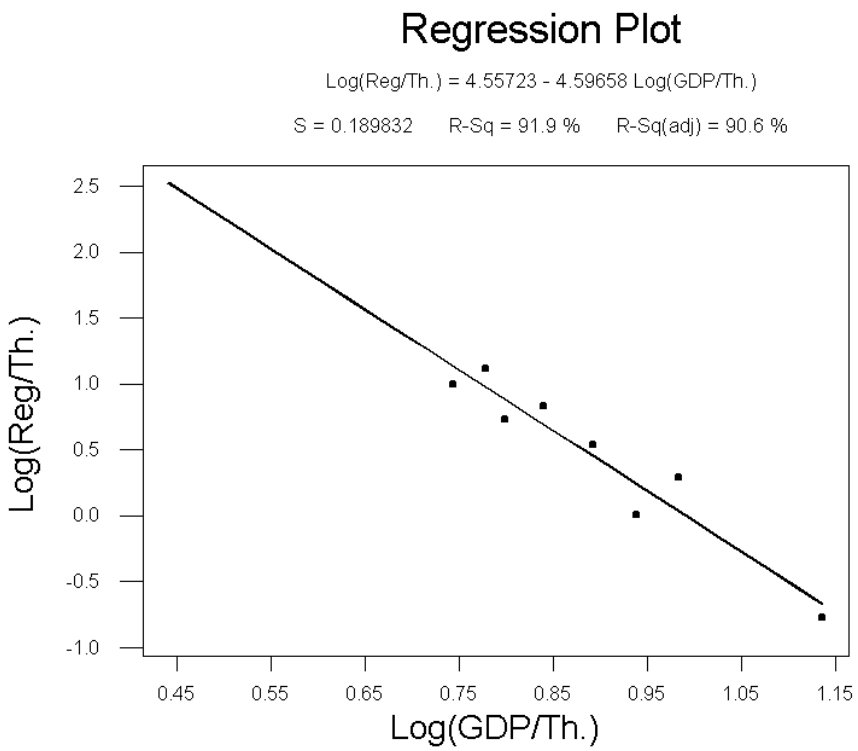
Figure 4.3 **Correlation between GDP per head in country of origin and proportion of the population registering on the WRS**



Source: Home Office Accession Monitoring Report, November 2005
Eurostat total population figures, 2005
Eurostat GDP figures, 2005

The DWP team (four economists and one statistician) chose to plot GDP-per-head on a log-scale even though its eight values only differed by a factor of less than five. But they left the registrations-per-head variable untransformed — even though its eight values differed by a factor of the order of 100. Using the 20-months' data now available, the next plot is what you get if you also use a log-scale for the registration-per-head figures — and leave room on the left for prediction for Bulgaria and Romania.

The numbers on the x-axis are now the logarithms to base 10 of the ratio of GDP in *million euros* to population (Th.) in *thousands*. Apart from a shift of origin, this is no different from what DWP did. However, the y-scale has now been changed — the y-variable is the logarithm to base 10 of the ratio of registrations to population in thousands. For Bulgaria the x-value is 0.44 and for Romania it is 0.56 .



The least-squares line (fitted by Minitab13 software) is $y = 4.56 - 4.60\ x$ with an R^2 of 0.92. The correlation coefficient is 0.96 (the square-root of 0.92). This is a much better statistical description of the positive relationship between the level of migration to register for work in the UK and economic deprivation in the home country than the one in DWP's Figure 4.3 (for which the correlation coefficient was only 0.84).

If the Home Office wholeheartedly accepts the argument that a burgeoning population is good for all of us, it ought to be willing to use this fitted straight line to predict the missing numbers for Romania and Bulgaria. Dealing first with Log(Reg/Th.) and rounding every prediction *down* from now on, the central predictions and corresponding 95%-confidence prediction intervals are 1.96 (1.30, 2.62) for Romania, and 2.52 (1.74, 3.31) for Bulgaria. Antilogging is a fading exercise in schools, but all we need to know is that Antilog(Log(Reg/Th.)) = Reg/Th. and that the antilog of a number y is the 10^y on our pocket calculators. Multiply the antilogged predictions from the graph by the populations in thousands and we get the corresponding predictions for the number of work registrations in a 20-month period:

Registrations	Central prediction	Lower prediction limit
Romania	1.9 millions	430 thousands
Bulgaria	2.5 millions	420 thousands

Presenting such figures, even in the new welcoming dispensation, might invite a press headline such as **"ARE THEY SERIOUS?"** — Romania's 1.9 millions and Bulgaria's 2.5 millions would represent over 8% and 32% of their populations! The Home Office would be able to point to the width of the 95%-confidence prediction intervals as a moderating influence on any response to these numbers. An even greater retreat from the Home Office's economic Panglossery would be to rule out all extrapolation beyond the range of the historical data as a foolish practice. Would that be enough?
Looking again at the Regression Plot, we can see that even if government were confident that they could stop the line increasing above the value 1.0 (corresponding to 10 registrations per thousand) we would still be left with central predictions of $10\times7{,}761$ or 77,000 for Bulgaria — and $10\times21{,}658.5$ or 210,000 for Romania.

Sources:

2005 Populations, Eurostat;
Accession Monitoring Report by HO, DWP, HM Revenue & Customs and ODPM, February 2006;
GDP at Market Prices (data as at 9 April 2006), Eurostat.

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