Cross-National Trends in Earnings Instability and Earnings Inequality*

Mary C. Daly
Federal Reserve Bank of San Francisco
101 Market Street Mailstop 1130
San Francisco, CA 94105-1579 USA
Phone: (415) 974-3186
Fax: (415) 977-4054
email: mary.daly@sf.frb.org

Robert G. Valletta
Federal Reserve Bank of San Francisco
101 Market Street Mailstop 1130
San Francisco, CA 94105-1579 USA
Phone: (415) 974-3345
Fax: (415) 977-4084
email: rob.valletta@sf.frb.org

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Abstract

Changes in inequality of yearly earnings can arise from changes in the distribution of lifetime earnings (permanent changes) and changes in the stability of earnings (transitory changes). Past research has found increases in both components in the United States over the past several decades. We extend this literature by comparing the United States with Germany and Great Britain. We use data from the Cross-National Equivalent Files (Cornell University) to document trends in cross-sectional and long-run earnings inequality. These data enable us to examine earnings dynamics during the years 1979-1996 for the United States, 1983-1997 for Germany, and 1990-1997 for Great Britain. Despite differences in labor market structure, our descriptive models reveal similar basic patterns of earnings mobility and dynamics in these countries. We then apply a method of moments approach to estimate the parameters of a heterogeneous growth model of permanent and transitory earnings. The results indicate that although there are substantial differences in overall cross-sectional inequality across these countries, the persistent component of earnings inequality was quite similar in each in the 1990s.

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I. Introduction

Rising inequality in individual earnings has been an important feature of the economic

landscape in the United States and many other advanced industrial countries in recent decades

(Gottschalk and Smeeding 1997, 2000). The pervasive rise in earnings inequality has generated

scores of studies documenting its growth and identifying its causes.[1] Most of the explanations

for rising earnings inequality are associated with rising dispersion in the distribution of lifetime

earnings. For example, the increasing market returns to formal education, which many

researchers have linked to the impact of skill-biased technological change, implies widening

permanent wage gaps between highly-educated and less-educated workers. However, increasing

dispersion in the cross-sectional distribution of earnings also can arise due to an increase in the

variance of short-term changes in earnings.   In their examination of U.S. data for the 1970s and

1980s, Gottschalk and Moffitt (1994) found that as much as one-half of the increase in the cross-

sectional variance of earnings is attributable to an increase in this transitory component.

Although subsequent authors (for example, Haider 2001) have reached different conclusions

regarding the exact shares of increasing permanent and transitory variance for overall U.S.

inequality trends, both components appear to be important part of the explanation for rising U.S.

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[1] In general, these studies have found that rising inequality can be linked to changes in characteristics of workers

(observable and unobservable), changes in labor market operations, and changes in underlying labor market

institutions. (see Katz and Autor 1999 for a survey of studies on the U.S.; Baker and Solon 2003 for recent research

on Canada).

inequality in the 1980s.

The role of transitory changes is important in that it relates to the more general issue of earnings mobility — the tendency for individuals' relative positions in the income distribution to change over time. If the transitory component of earnings variance is increasing, than rising overall earnings dispersion may largely represent reshuffling of individuals' relative income ranks from year to year, rather than increasing gaps in terms of permanent income and well-being. This would lead to a more benign interpretation of rising inequality than the typical inference of a widening gulf between the "haves" and "have-nots." Moreover, the sources of rising permanent and transitory variance are likely to differ, which implies that the explanation for observed changes in overall inequality differs depending on which component predominates. Finally, investigation of earnings mobility is especially interesting in a cross-national setting. The U.S. and European countries differ substantially in labor market structure, pre-market opportunities, and political and economic institutions, each of which is likely to affect the degree of earnings mobility. For example, the institutional characteristics of European labor markets may imply a smaller transitory component than the U.S. Under such circumstances, European countries may have similar levels of persistent inequality as the U.S., despite substantial differences in overall (cross-sectional) earnings inequality.

We examine the patterns of earnings mobility, and its contribution to overall earnings inequality, in Germany, Great Britain, and the United States. We use panel data from the Cross-National Equivalent Files (CNEF), in which household panel surveys for each country have been extensively reprocessed to enhance data comparability. These files provide data for the 1980s and 1990s for Germany and the U.S. and the 1990s for Great Britain. As such, we are able to

examine changing inequality and mobility over time in the former two countries, and to make comparisons across all three countries for the 1990s. We find little increase in permanent and transitory earnings variance in the U.S. between the 1980s and 1990s, but a substantial increase in both components in Germany during the same period. About half of the increase in the permanent component is due to the entry of former East Germans into the West German labor market; however, reunification actually served to reduce the increase in transitory earnings variance (and earnings mobility). Moreover, despite cross-country differences in labor market institutions and the variance of transitory changes, our descriptive models reveal similar basic patterns of earnings mobility in these countries. We extend the descriptive analyses by estimating a heterogeneous growth model of permanent and transitory earnings (Haider 2001) for the entire period available for each country. We find that despite substantial differences in overall annual earnings inequality across the three countries, the persistent components have become quite similar over time. These preliminary findings suggest that the differences in cross-sectional earnings inequality in the U.S., Germany, and Great Britain may be attributable to earnings instability rather than differences in persistent earnings inequality.

II. Data Source and Research Issues

Until about the late 1980s, the lack of harmonized cross-country data sources largely precluded comparative studies of earnings and income inequality. Since then, several data sources have been developed that provide relatively consistent measurement of income and other variables across countries. The largest of these is the Luxembourg Income Study (LIS), which has provided harmonized income data for a growing number of countries (now 25) since about

the mid-1980s. The LIS has been used extensively to assess comparative developments in income inequality and living standards.

To take the additional step of analyzing longitudinal patterns in earnings, panel data are required. One approach is to design a multi-country household panel survey; a recent example is the European Community Household Panel (ECHP), administered in 15 European countries during the years 1994-1997 (and perhaps additional years as well). However, this approach has proved to be challenging, due to the expense of designing and maintaining a representative and consistent household panel survey. An alternative approach is to take existing household panel surveys and form comparable income and related variables. This is the approach taken in the Cross-National Equivalent Files (CNEF), prepared at Cornell University (Burkhauser et al. 2000). The CNEF provide multi-year household panel data (6-18 years) from the 1980s and 1990s for four advanced industrial countries: Canada, Germany, Great Britain, and the United States. Due to the limited length of the Canadian panel, we exclude it and focus in this paper on data for the other three countries: [2] the German Socio-Economic Panel (GSOEP, income years 1983-1999), [3] the British Household Panel Survey (BHPS, income years 1990-1998), and the United States Panel Study of Income Dynamics (PSID, income years 1979-1996).[4]

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[2] The maximum panel length in the Canadian Survey of Labor and Income Dynamics (SLID) is six years, after which households rotate out of the sample. In comparison to panel lengths of 9 to 17 years for the other countries, this time frame is too short to provide comparable estimates of earnings dynamics for Canada.

[3] Observations from the former East Germany were included as of the 1990 survey (1989 income year), although household income data for these observations were not recorded until the 1992 survey.

[4] We use data from the December 2001 CNEF release for Germany, and data from a late 2002 revision to the December 2001 release for the U.S. For Great Britain, we use data from the November 2000 release, due to forthcoming corrections to the income data in the December 2001 release of the CNEF-BHPS.

These three countries provide a useful set of comparisons in regard to earnings inequality and dynamics. They are at similar levels of economic development and income, which supports straightforward comparisons of labor market outcomes and behavior. Each of these countries faced a set of socio-economic factors, such as rising returns to skill and changes in family structure, that led to (or increased pressure for) rising inequality in earnings and family income (for example, see the various contributions in McFate, Lawson, and Wilson 1995 regarding changes during the 1980s). However, the underlying educational and wage-setting institutions differ substantially between these countries. For example, Germany is notable for centralized bargaining and an educational system that tracks some individuals towards specific careers at a young age. By contrast, the U.S. labor market is highly decentralized, as is its educational system, with substantial variation evident across U.S. states in the quality and quantity of public educational resources.

In earlier work, Burkhauser, Holtz-Eakin, and Rhody (1997) examined earnings mobility and dynamics in the U.S. and Germany during the 1990s. They found very similar patterns of overall earnings mobility for men in the two countries, as measured by transitions across quintiles of the earnings distribution over varying time periods (1 to 5 years). However, results from their formal model of underlying dynamics point to differences between the countries, with permanent individual effects playing an especially large role in the U.S. and high persistence of shocks being of much greater importance in Germany. Relative to this work, we extend the analysis into the 1990s, which enables us to compare the pre- and post-reunification Germany and to examine whether an apparent flattening in the trend towards higher earnings inequality in the U.S. during the 1990s (Card and DiNardo 2002) also applies to earnings instability. We also

compare these countries to Great Britain, which provides a useful intermediate comparison.

Britain underwent a political transformation in the 1980s that led to a reduced role of

government in some sectors of the economy, and it experienced a large increase in inequality in

the 1980s similar to the U.S. At the same time, Britain retains some features of European labor

markets — such as greater union density than the U.S. — that make it more similar to Germany

than to the U.S. In addition to these comparisons over time and across countries, we contribute

to the literature methodologically, by applying Haider's (2001) heterogeneous growth model of

permanent and transitory earnings to cross-national earnings comparisons.

III. Sample and Descriptive Results

Sample Definition

For our analyses of earnings mobility, we use samples of male household heads; this

group has been the focus for the existing literature on earnings mobility. Our basic age

restriction is to individuals aged between 25 and 61 in the cross-section. For the various

longitudinal samples, individuals who meet our other sample restrictions are eliminated from the

sample if their maximum age is greater than 61 during the sample frame. Our analysis variable

is yearly labor earnings. Following most of the previous literature, we include in the sample only

individuals with positive earnings.[5] Rather than imposing a balanced sample requirement, which

would eliminate observations with useful information, we require only multiple consecutive

earnings observations for individuals who meet our demographic restrictions. Individuals with

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[5] For the analyses described below, we delete ("trim") positive earnings observations that fall above or below specific cutoffs. This trimming is designed to remove excess influence of outliers on the results. As such, the trimming rule varies depending on the application, as noted below.

years of zero earnings appearing between years of positive earnings are eliminated from the sample.[6] We measure earnings in each country's separate currency, adjusted for inflation using 1996 as the base year.

Yearly Inequality

Our first set of descriptive calculations establishes the trend in yearly earnings inequality in our three countries. Table 1 lists mean real annual earnings in the first column. The subsequent columns provide standard measures of yearly inequality: the standard deviation of log earnings,[7] the ratio of earnings at the 90th and 10th percentile of the earnings distribution,[8] and the Gini coefficient.

Figure 1 (panels A-C) display the inequality measures for each of the three countries. In the U.S., inequality increased sharply around the early 1980s recession and somewhat less sharply around the early 1990s recession, with a flattening or perhaps reduction beginning around the mid-1990s.[9] The pattern over time of inequality in Germany is dominated by the impact of German reunification. Income data for residents of the former East Germany was first recorded in the GSOEP for income year 1991 (survey year 1992). Each of the three inequality

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[6] This is Haider's (2001) "revolving balanced panel," which provides the maximum information on age-adjusted earnings possible while eliminating the influence of changes in labor force composition over the business cycle. The role of secular and cyclical changes in the incidence of zeros is an interesting area for additional research.

[7] The standard deviation is very sensitive to low outliers, so we deleted observations with values below $150, 270 DM, or 100 £ for this calculation only.

[8] We rescaled the 90-10 ratio by first taking the log of the ratio of the 90th percentile to the 10th percentile, then dividing by 2.56. Under the assumption of a lognormal earnings distribution, the transformed ratio has approximately the same limiting distribution as the standard deviation of log earnings (Card and DiNardo 2001).

[9] Using U.S. data on annual earnings from the March CPS files, Card and DiNardo (2001) found that earnings inequality for all workers and for men who worked full time for the entire year rose sharply during the 1980s but was flat throughout the 1990s.

measures for Germany show relatively constant inequality in the 1980s, with a sharp increase in 1991 followed by a drift upwards in subsequent years. In Great Britain, for which we only have data for the 1990s, the various measures indicate an increase in inequality in the early 1990s followed by a reduction. This may indicate a reversal of the sharp increase in inequality observed in the 1980s through the early 1990s in Britain (Gottschalk and Smeeding 2000), although a longer time-series is needed to verify this. Finally, we should note that the levels of inequality generally are highest in the U.S. and lowest in Germany. Britain mostly falls in the middle, although the sharp decrease there and increase in Germany as of the mid-1990s caused the two countries to look quite similar in terms of the overall level of earnings inequality for male household head.

Permanent and Transitory Variance

Following the approach of Gottschalk and Moffitt (1994, Table 1), Table 2 (panels A-D) lists the permanent and transitory components of earnings variance.[10] After defining 8-year sub-periods that enhance cross-country comparability of the results, we calculate these components as follows. First, we run regressions of log(earnings) on a quartic in age; this adjusts the data to avoid contaminating the permanent and transitory measures by normal life-cycle earnings growth. We then use the residuals from these regressions to compute the following components of variance.

(1) *Permanent component.* This is the variance across individuals of their mean log earnings for the entire sample period.

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[10] Like Gottschalk and Moffitt, we deleted outliers by trimming the top and bottom 1 percent of the earnings distribution within age/education/year cells (age/year in Britain, since years of education are not available in the BHPS data).

(2) *Transitory component.* This is the variance of the deviation of yearly log earnings from individual mean earnings, calculated for each individual and then averaged across the sample.

The results of these calculations are displayed in Table 2. Panel A displays results for the U.S. Our estimate of permanent variance in the 1980s is slightly higher than Gottschalk and Moffitt's (0.344 versus 0.284), and our estimate of transitory variance is somewhat lower (0.110 versus 0.148).[11] These differences probably are explained by small sample differences, notably our somewhat narrower age restriction and our inclusion of non-whites. Compared to Gottschalk and Moffitt's finding of substantial increases in permanent and transitory variances between the 1970s and 1980s, we find very little increase in both components of variance between the 1980s and 1990s. The one exception is for men with at least 16 years of education (college degrees), for whom both components increased substantially. This may reflect increases in returns to unobservable skills that are most pronounced among highly educated workers, perhaps due to skill-biased technological change related to the diffusion of new information technologies. Overall, the pattern of changes implied by our study combined with Gottschalk and Moffitt — i.e., that during the 1980s and 1990s, changes in permanent and transitory variance occurred together — suggests related explanations for the pattern in both components.

Panels B and C of Table 2 display results for Germany, with observations from the former East Germany included in the 1990s sample in panel B but excluded in Panel C. Both permanent and transitory variance increased substantially in Germany between the 1980s and 1990s, with especially large increases evident for the least-educated individuals. A comparison

between panels B and C reveals that about one-half of the increase in permanent variance is attributable to the entry of former East Germans into the German labor market; the increase in overall permanent variance is only half as large when the 1991-1998 sample is restricted to West Germans. In contrast, the increase in overall transitory variance is larger when the sample is restricted to West Germans (panel C) than when East Germans are included (panel B). Moreover, changes over time in both components within education and age categories are quite different across the two panels, which suggests very different earnings dynamics for East and West Germans within skill categories.

In Panel D of Table 2, we display results for the 1990s for all three countries in our sample.[12] The U.S. has higher permanent and transitory variance then either of the other two countries, with Germany having the lowest and Great Britain falling in between the other two. A similar pattern generally is evident within educational and age categories. Moreover, for the overall sample in each country, the transitory component generally is about one-third as large as the permanent component. Like the co-movement in the permanent and transitory components in the U.S. over the past several decades (see discussion of panel A), this similarity in the structure of earnings dynamics across the three countries suggests that explanations for changing inequality or cross-country differences in inequality should jointly explain the pattern in both components.

Percentile Transitions

Previous authors have characterized earnings mobility by examining the incidence of

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[11] The results are similar when we use the same sample period as Gottschalk and Moffitt (1979-87).
[12] The absence of an education variable in the BHPS precludes breakdowns by education category for the British data.

transitions across quintiles of the earnings distribution. This involves calculating the fraction of individuals who move from one quintile in the percentile ranking of earnings — say, the bottom 20 percent of the distribution — to a different quintile of the distribution a year or several years later. For example, Burkhauser, Holtz-Eakin, and Rhody (1997) compared quintile transition rates in the U.S. and Germany in the 1980s, for periods ranging from 1 year to 5 years, and found little difference across the two countries. One problem with quintile transition analyses is that for transitions across adjacent quintiles, which constitute the overwhelming majority of all transitions, it is not clear whether the underlying movement was small or large. For example, a movement from the second up to the first quintile could arise due to movement from the 21st to the 19th percentile, or it could arise due to movement from the 39th to the 1st percentile. Thus, the quintile transition approach does not distinguish between large and small changes in earnings percentile rank.

Given this consideration, we take a slightly different approach to analyzing mobility across percentiles of the earnings distribution. For our samples of male household heads aged 25-61, we first regressed earnings on a quartic in age (as above) and using the residuals calculated the exact change in each individuals' earnings percentile rank across years.[13] This produces a largely continuous distribution of percentile changes, which can then be displayed graphically and compared across countries and time periods. We use standard kernel density estimation techniques to display these densities in chart form.

Figure 2 (panels A-F) shows the results of this analysis. We only display results for transitions over 6-year periods, for simplicity and because the pattern of percentile transitions is

nearly indistinguishable across countries and year groupings for transitions over short time periods. Panel A indicates that earnings mobility was lower in the 1990s than in the 1980s in the U.S.: there is more density mass around zero in the 1990s than in the 1980s, with a higher incidence of percentile changes in the range of ±10-30% during the 1980s. A similar pattern over time is evident for Germany in Figure 2B, with little difference evident when former East Germans are excluded from the 1990s sample (panel C).

The comparison across countries is provided in panels D and E. Mobility was somewhat higher in the U.S. than in Germany in the 1980s (panel D) but this difference was eliminated in the 1990s (panel E). Mobility was somewhat higher in Britain than in the other two countries during the 1990s.

In general, the analyses of percentile transitions do not correspond in a consistent fashion to the results regarding changes and differences in transitory variances from Table 2. Earnings mobility fell in Germany between the 1980s and 1990s (Figure 2B), which is consistent with the larger absolute increase in permanent variance than in transitory variance in Germany (Table 2B). On the other hand, the higher degree of earnings mobility in Britain than in the other two countries (Figure 2E) is not matched by higher transitory variance in that country (Table 2). The apparent disconnect between earnings mobility and permanent/transitory variance may arise because these descriptive calculations obscure a more complicated structure of earnings dynamics, such as underlying shocks to earnings whose persistence varies over time and across countries. A more formal model of earning dynamics is required to analyze such patterns.

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[13] We do not trim the sample for this analysis, as the percentile rankings are insensitive to outliers.

IV. Parametric Model of Earnings Inequality and Instability

Model

Following Haider (2001) we more formally estimate earnings inequality and instability using a heterogeneous growth model of the form:

$$(1) \qquad \log Y_{it} = f(X_{it}, \psi_t) + p_t(\alpha_i + \beta_i X_{it}) + \varepsilon_{it}, ,$$

where Y_{it} is real earnings for worker i in year t, X_{it} is age, f is a polynomial function of age with parameters ψ_t and ε_{it} is a mean-reverting earnings shock. The inclusion of the heterogeneous growth term $(\alpha_i + \beta_i X_{it})$ allows individuals to have different intercepts, slopes, or any combination of the two, relative to the mean profile $f(X_{it}, \psi_t)$. The period-specific factor loading p_t allows an individual's deviation from the mean profile to change over time. The factor loading is normalized to equal one in the first period. An increase (decrease) in p_t generates increased (decreased) dispersion in current earnings, by accentuating (attenuating) any individual's deviations from the mean profile. If p_t is zero, individuals deviate from the mean profile only because of the mean-reverting error term ε_{it}.

Again, following Haider, we assume that transitory shocks and the individual specific – parameters are uncorrelated (Cov[α_i,ε_{it}]=Cov[β_i,ε_{it}] = 0). We also assume that the variances of the individual parameters do not change over time (Var[α_i]=σ_α^2, Var[β_i]=σ_β^2, and Cov[α_i,β_i]=$\sigma_{\alpha\beta}$.

Based on this model, annual earnings inequality can be decomposed into a persistent component and an instability component. Expressing age-adjusted annual (log) earnings inequality as:

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(2) $$Var(\log Y_{it} \mid X_{it}) = p_t^2(\sigma_\alpha^2 + \sigma_\beta^2 X_{it}^2 + 2\sigma_{\alpha\beta} X_{it}) + \sigma_{\varepsilon_t}^2,$$

the first term on the right-hand side measures the persistent component of inequality or the

inequality of the individual specific earnings profiles for a given age. The second term measures

earnings instability or the cross-sectional variance of the idiosyncratic deviations in year t, $\sigma_{\varepsilon_t}^2$.

In the current formulation we allow an individual's deviation from his profile to be serially

correlated by modeling ε_{it} from equation (1) as an ARMA (1,1) process. Under this

formulation, ε_{it} is defined as:

(3) $$\varepsilon_{it} = \rho\varepsilon_{i(t-1)} + \theta\nu_{i(t-1)} + \nu_{it}.$$

The primitive error term ν_{it} is the individual- and time-specific transitory shock. The variance

of the primitive error term $(\sigma_{\nu_t}^2)$ measures the contemporaneous volatility in the labor market.

The memory inherent in the ARMA (1,1) process means that the transitory shocks ν_{it} may build

up over time in ε_{it}, the distance an individual is from his profile. We allow the variance of the

primitive error term $(\sigma_{\nu_t}^2)$ to vary over time.

The parameters in the model can be estimated through their implied contribution to the

autocovariance structure of earnings. The estimation is in two stages. First, using ordinary least

squares, we regress earnings on a quartic in age (as above), recovering estimates of the

parameters ψ_t and the residuals of the equation. From the residuals $\hat{y}_{it}$, we calculate an

individual's contribution to the empirical covariance matrix; the full empirical covariance matrix

is the matrix average of these individual contributions.

In the second stage, we estimate the parameters of the ARMA process and p_t, σ_α^2, σ_β^2, and $\sigma_{\alpha\beta}$ by fitting the implications of the model to the empirical covariance matrix using a generalized method of moments (GMM) framework. In particular, equation (1) implies that the model covariance matrix has the typical diagonal element

(4) $$Var(y_i \mid X_i) = p_t^2(\sigma_\alpha^2 + \sigma_\beta^2 X_{it}^2 + 2\sigma_{\alpha\beta} X_{it}) + \sigma_{\varepsilon_t}^2$$

and the typical off-diagonal element

(5) $$Cov(y_{is}, y_{it} \mid X_i) = p_s p_t(\sigma_\alpha^2 + \sigma_\beta^2 X_{is} X_{it} + \sigma_{\alpha\beta}(X_{is} + X_{it}) + \sigma_{\varepsilon_s \varepsilon_t}$$

where $s \neq t$. We use an iterative nonlinear least squares procedure to fit these equations to the empirical covariance matrix, which produces minimum-distance (GMM) estimates of the model parameters (including the parameters of the ARMA (1,1) process, which determine the order of $\sigma_{\varepsilon_t}^2$ and $\sigma_{\varepsilon_s \varepsilon_t}^2$).

Results

The results of the GMM estimation are displayed in Table 3 and Figures 3 and 4. Before moving to the cross-national results we first consider our estimates relative to those of Haider (2001). For the overlapping years in both samples our estimates of actual annual inequality are lower than Haider's (see Figure 3, Panel A and Table 3 Panel A for U.S. results). These differences likely owe to small differences in sample selection and trimming. Despite small differences in the level of measured inequality, the overall trends in our sample generally follow those documented by Haider. Specifically, like Haider, we find that the persistent component of inequality increased during the 1980s. Also like Haider, we show that the transitory component

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of inequality was flat to declining during the 1980s.[14]

Turning to the cross-national results, a number of things are worth noting about the estimation in each of the samples. First, as shown in Figure 3, the relative importance of the persistent and transitory components of variance in overall inequality differs across countries. In the U.S. the persistent component grew consistently during the 1980s and accounted for about two-thirds of overall inequality by the early 1990s. In the mid-1990s the share of total inequality accounted for by persistent differences fell back to about half of the predicted annual inequality. Germany experienced a different pattern, with the persistent component of inequality becoming an increasing share of total inequality over the past decade. The pattern in Great Britain was similar to the U.S. with persistent inequality explaining about one-half of predicted annual inequality.

Figure 4 directly compares the levels and trends of actual annual, persistent, and transitory inequality across our three samples. Panel A of the figure confirms that Germany has the lowest level of overall cross-sectional earnings inequality in nearly every year, although the gap closed somewhat in the latter portion of the 1990s. The closing gap reflects relatively rapid growth in inequality in Germany over the period. Panel B displays the trends for the persistent component of inequality. The findings indicate that persistent inequality rose to levels close to those in Britain during the late 1990s. Overall, the figure highlights relative convergence across countries in the persistent components of inequality.[15] The convergence of the persistent components is attributable to a decline in persistent inequality in the U.S. and an increase in

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[14] As Haider notes, this result contrasts with that of Gottschalk and Moffitt (1995) who find an increase in transitory variance during the 1980s.

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persistent inequality in Germany. Panel C indicates shows convergence in the transitory components of inequality across countries. Earnings instability fell sharply in the U.S. and Great Britain, and picked up substantially in Germany.

V. Conclusions

Our comparative analyses of the permanent and transitory components of earnings for Germany, Great Britain, and the United States reveal substantial similarities between these countries. Each country saw increased cross-sectional earnings inequality over the last two decades. In the U.S. the largest increase occurred in the 1980s, with inequality leveling off somewhat in the 1990s. In Germany, reunification was associated with rising earnings inequality, even among a sample of West Germans. In Great Britain, inequality rose rapidly early in the 1990s but fell substantially after 1995. In all three countries, both the persistent and transitory components have been important to the overall trend, albeit at different time periods in the sample.

More generally, our preliminary examination of earnings inequality and instability cross-nationally highlights the importance of performing such decompositions. The analyses show that despite very different levels of overall inequality between the U.S. and Germany for instance, the level of persistent inequality in the two countries converged in the 1990s.

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[15] Including the East German sample brings measured persistent inequality in Germany to the levels recorded for Great Britain.

References

Blau, Francine D., and Lawrence M. Kahn. 1999. "Institutions and Laws in the Labor Market." In *Handbook of Labor Economics*, Volume 3A, edited by Orley Ashenfelter and David Card. Amsterdam: Elsevier.

Buchinsky, Moshe and Jennifer Hunt. 1999. "Wage Mobility in the United States." *Review of Economics and Statistics* 81 (August): 351-68.

Burkhauser, Richard V., Barbara A. Butrica, Mary C. Daly, and Dean R. Lillard. 2000. "The Cross-National Equivalent File: A Product of Cross-National Research." Working Paper, Department of Policy Analysis and Management, Cornell University.

Burkhauser, Richard V., Douglas Holtz-Eakin, and Stephen E. Rhody. 1997. "Labor Earnings Mobility and Inequality in the United States and Germany during the Growth Years of the 1980s." *International Economic Review* 38(4, Nov.): 775-794.

Card, David, and John DiNardo. 2002. "Skill-Biased Technological Change and Rising Wage Inequality: Some Problems and Puzzles." *Journal of Labor Economics* 20(4): 733-783.

Gittleman, Maury and Mary Joyce. 1996. "Earnings Mobility and Long-Run Inequality: An Analysis Using Matched CPS Data." *Industrial Relations* 35 (April): 180-96.

Gottschalk, Peter and Robert Moffitt. 1994. "The Growth of Earnings Instability in the U.S. Labor Market." *Brookings Papers on Economic Activity* 1994 (2): 217-254.

Gottschalk, Peter, and Timothy M. Smeeding. 1997. "Cross-National Comparisons of Earnings and Income Inequality." *Journal of Economic Literature* 35 (June 1997): 633-687.

Gottschalk, Peter, and Timothy M. Smeeding. 2000. "Empirical Evidence on Income Inequality in Industrialized Countries." In A.B. Atkinson and F. Bourgignon (eds.), *Handbook of Income Distribution*. New York: Elsevier-North Holland.

Haider, Steven. 2001. "Earnings Instability and Earnings Inequality of Males in the United States: 1967-1991." *Journal of Labor Economics* 19 (4, October): 799-836.

Katz, Lawrence F., and David H. Autor. 1999. "Changes in the Wage Structure and Earnings Inequality." In *Handbook of Labor Economics*, Volume 3A, edited by Orley Ashenfelter and David Card. Amsterdam: Elsevier.

McFate, Katherine, Roger Lawson, and William Julius Wilson (eds.). 1995. *Poverty, Inequality and the Future of Social Policy: Western States in the New Social Order.* New York: Russell Sage Foundataion.

Table 1
Yearly Inequality Summary Statistics

Panel A
Germany, Survey 1984-2000

Income Year	Mean Earnings	SD of log(Y)*	90-10 Ratio**	Gini Coef
1983	56404	0.555	0.379	0.263
1984	55977	0.540	0.391	0.263
1985	55148	0.557	0.398	0.251
1986	57869	0.557	0.416	0.256
1987	59781	0.516	0.379	0.245
1988	61513	0.523	0.383	0.248
1989	62906	0.557	0.391	0.263
1990	62808	0.535	0.384	0.244
1991	58185	0.618	0.501	0.278
1992	59067	0.634	0.512	0.287
1993	57833	0.646	0.525	0.285
1994	57565	0.674	0.525	0.293
1995	58804	0.688	0.539	0.287
1996	59643	0.689	0.544	0.298
1997	59319	0.687	0.565	0.299
1998	60979	0.677	0.554	0.300
1999	62713	0.710	0.530	0.299

Panel B
Britain, Survey 1991-1998

Income Year	Mean Earnings	SD of log(Y)*	90-10 Ratio**	Gini Coef
1990	18227	0.698	0.558	0.313
1991	18113	0.689	0.564	0.310
1992	18468	0.727	0.588	0.318
1993	18131	0.769	0.636	0.328
1994	18366	0.790	0.600	0.324
1995	19077	0.686	0.553	0.312
1996	18387	0.642	0.548	0.306
1997	18971	0.692	0.537	0.314

(continued)

Table 1 (continued)

Panel C
US, Survey 1980-1997

Income Year	Mean Earnings	SD of log(Y)*	90-10 Ratio**	Gini Coef
1979	44220	0.702	0.534	0.302
1980	41655	0.732	0.579	0.317
1981	41105	0.751	0.583	0.325
1982	40215	0.832	0.673	0.356
1983	41260	0.828	0.675	0.355
1984	42951	0.793	0.643	0.358
1985	43209	0.802	0.639	0.362
1986	43961	0.794	0.666	0.362
1987	45099	0.744	0.643	0.368
1988	45224	0.763	0.663	0.367
1989	44761	0.770	0.648	0.369
1990	44316	0.764	0.652	0.371
1991	44258	0.819	0.675	0.383
1992	45749	0.833	0.704	0.387
1993	45916	0.844	0.697	0.401
1994	45705	0.843	0.69	0.398
1995	46049	0.815	0.671	0.399
1996	46861	0.826	0.654	0.390

Note: Earnings measured in inflation-adjusted terms (1996 base)
** SD calculation drops values below 100 Pounds, 150 Dollars, or 270 DM (in 1996 units), respectively
*** 90-10 ratio is the log of 90th percentile earnings divided by 10th percentile earnings, divided by 2.56

Table 2: Variances of Permanent and Transitory Real Annual Earnings

Panel A: United States

Sample Definition	Permanent Variance		Change	% Change	Transitory Variance		Change	% Change
	1981-1988	1989-1996			1981-1988	1989-1996		
All	0.344	0.359	0.015	4.4	0.110	0.120	0.010	9.1
Years of Education								
Fewer than 12	0.404	0.413	0.009	2.2	0.154	0.184	0.030	19.5
12 or more	0.300	0.325	0.025	8.3	0.105	0.114	0.009	8.6
16 or more	0.247	0.386	0.139	56.3	0.087	0.119	0.032	36.8
Age								
Age 25-34	0.323	0.309	-0.014	-4.3	0.108	0.115	0.007	6.5
Age 35-44	0.321	0.365	0.044	13.7	0.089	0.113	0.024	27.0
Age 45-54	0.449	0.470	0.021	4.7	0.150	0.146	-0.004	-2.7

Panel B: Germany

Sample Definition	Permanent Variance		Change	% Change	Transitory Variance		Change	% Change
	1983-1990	1991-1998*			1983-1990	1991-1998*		
All	0.155	0.222	0.067	43.2	0.052	0.076	0.024	46.2
Years of Education								
Less Than HS	0.083	0.164	0.081	97.6	0.051	0.081	0.030	58.8
High School	0.135	0.209	0.074	54.8	0.051	0.072	0.021	41.2
More than HS	0.198	0.249	0.051	25.8	0.057	0.077	0.020	35.1
Age								
Age 25-34	0.172	0.214	0.042	24.4	0.070	0.089	0.019	27.1
Age 35-44	0.132	0.206	0.074	56.1	0.040	0.057	0.017	42.5
Age 45-54	0.162	0.247	0.085	52.5	0.047	0.082	0.035	74.5

 * 1991-1998 data include observations from former East Germany

(continued)

Table 2 (continued)

Panel C: West Germany only

Sample Definition	Permanent Variance		Change	% Change	Transitory Variance		Change	% Change
	1983-1990	1991-1998			1983-1990	1991-1998		
All	0.155	0.189	0.034	21.9	0.052	0.103	0.051	98.1
Years of Education								
Less Than HS	0.083	0.319	0.236	284.3	0.051	0.039	-0.012	-23.5
High School	0.135	0.174	0.039	28.9	0.051	0.088	0.037	72.5
More than HS	0.198	0.174	-0.024	-12.1	0.057	0.142	0.085	149.1
Age								
Age 25-34	0.172	0.101	-0.071	-41.3	0.070	0.093	0.023	32.9
Age 35-44	0.132	0.268	0.136	103.0	0.040	0.094	0.054	135.0
Age 45-54	0.162	0.215	0.053	32.7	0.047	0.126	0.079	168.1

Table 2 (continued)

Panel D: United States, Germany, and Great Britain (1990s)

Sample Definition	Permanent Variance			Transitory Variance		
	U.S. 1989-1996	Germany 1991-1998*	Britain 1990-1997	U.S. 1989-1996	Germany 1991-1998*	Britain 1990-1997
All	0.359	0.222	0.299	0.120	0.076	0.096
Years of Education*						
Less Than HS	0.413	0.164	*n/a*	0.184	0.081	*n/a*
High School	0.325	0.209	*n/a*	0.114	0.072	*n/a*
More than HS	0.386	0.249	*n/a*	0.119	0.077	*n/a*
Age						
Age 25-34	0.309	0.214	0.284	0.115	0.089	0.067
Age 35-44	0.365	0.206	0.285	0.113	0.057	0.097
Age 45-54	0.470	0.247	0.337	0.146	0.082	0.136

* 1991-1998 data include observations from former East Germany

Table 3
Estimates of Earnings Inequality and Instability

Panel A. United States

Year	Actual Annual Inequality	Predicted Annual Inequality	Instability	Persistent Inequality
1979	0.249	0.249	0.128	0.121
1980	0.272	0.270	0.126	0.144
1981	0.296	0.294	0.125	0.170
1982	0.367	0.365	0.183	0.182
1983	0.324	0.324	0.149	0.175
1984	0.313	0.310	0.141	0.168
1985	0.321	0.318	0.141	0.178
1986	0.330	0.334	0.146	0.188
1987	0.335	0.331	0.150	0.182
1988	0.354	0.352	0.144	0.208
1989	0.344	0.340	0.128	0.212
1990	0.348	0.352	0.128	0.224
1991	0.371	0.374	0.157	0.216
1992	0.406	0.397	0.205	0.193
1993	0.395	0.391	0.187	0.204
1994	0.379	0.378	0.172	0.207
1995	0.380	0.377	0.173	0.204
1996	0.354	0.353	0.167	0.186

Panel B. Germany

Year	Actual Annual Inequality	Predicted Annual	Instability	Persistent Inequality
1983	0.167	0.167	0.093	0.074
1984	0.180	0.179	0.099	0.080
1985	0.176	0.177	0.082	0.096
1986	0.162	0.162	0.069	0.093
1987	0.162	0.162	0.071	0.091
1988	0.154	0.155	0.064	0.091
1989	0.149	0.150	0.060	0.090
1990	0.169	0.166	0.074	0.091
1991	0.141	0.141	0.047	0.094
1992	0.159	0.159	0.060	0.099
1993	0.174	0.176	0.070	0.105
1994	0.208	0.208	0.100	0.107
1995	0.213	0.209	0.093	0.116
1996	0.214	0.213	0.081	0.133
1997	0.242	0.243	0.102	0.142
1998	0.232	0.230	0.107	0.123
1999	0.232	0.231	0.099	0.132

Table 3 (continued)

	Panel C. Great Britain			
Year	Actual Annual Inequality	Predicted Annual	Instability	Persistent Inequality
1990	0.284	0.284	0.130	0.154
1991	0.288	0.288	0.129	0.159
1992	0.314	0.311	0.160	0.151
1993	0.346	0.347	0.191	0.156
1994	0.333	0.332	0.192	0.140
1995	0.291	0.288	0.123	0.165
1996	0.309	0.309	0.147	0.163
1997	0.284	0.284	0.124	0.160

Figure 1A: SD of Log(earnings)
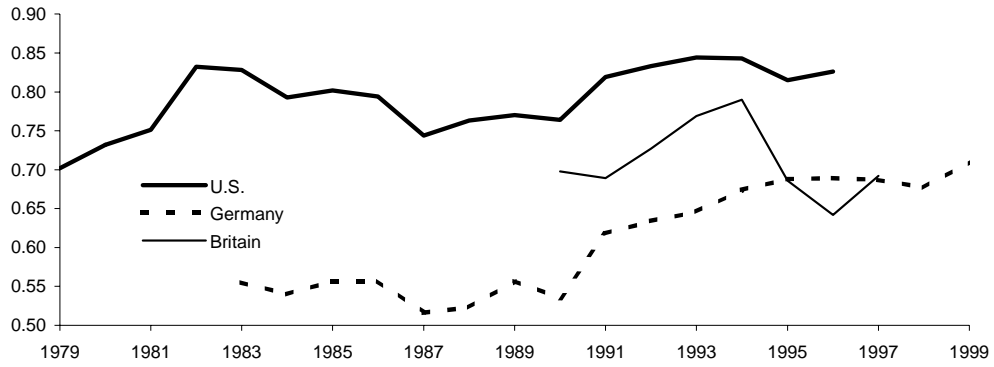
Figure 1B: 90-10 Percentile Ratio*
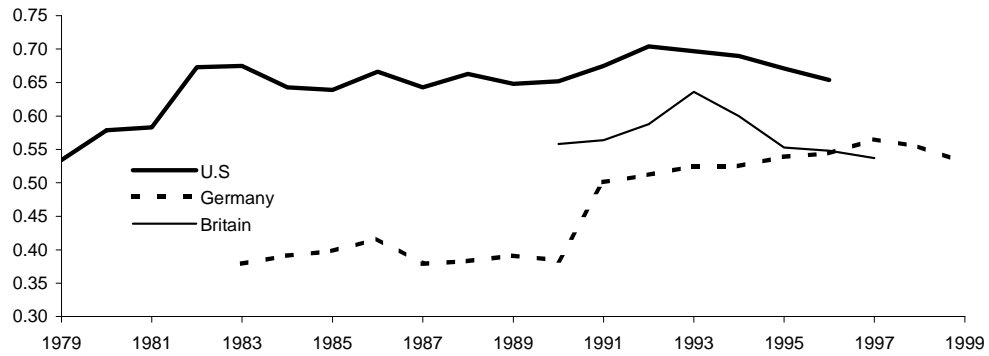
* Measured as (log(p90/p10))/2.56 (see text)

Figure 1C: Gini Coefficient
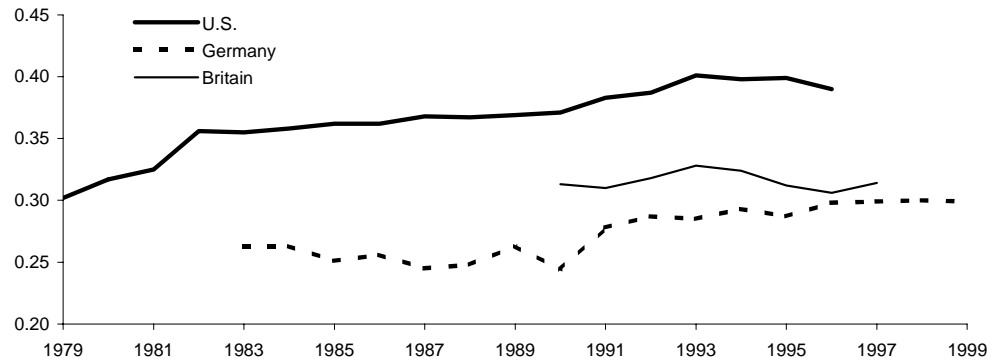
Figure 2: Density of Earnings Percentile Transitions, 6-year Changes

2A: United States
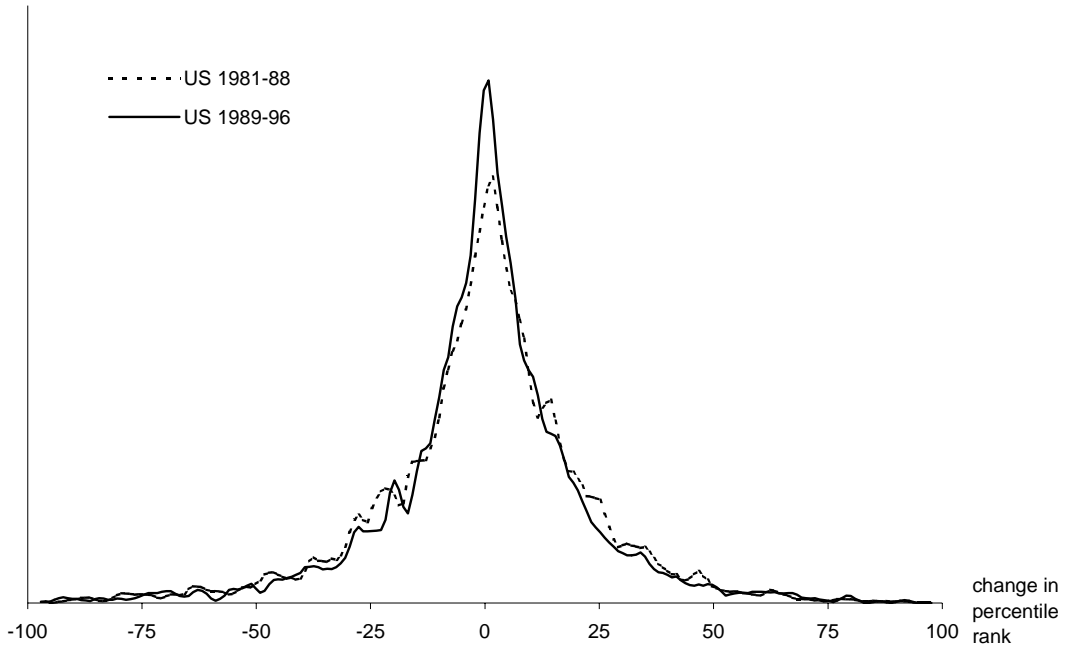
Figure 2 (continued)

2B: Germany
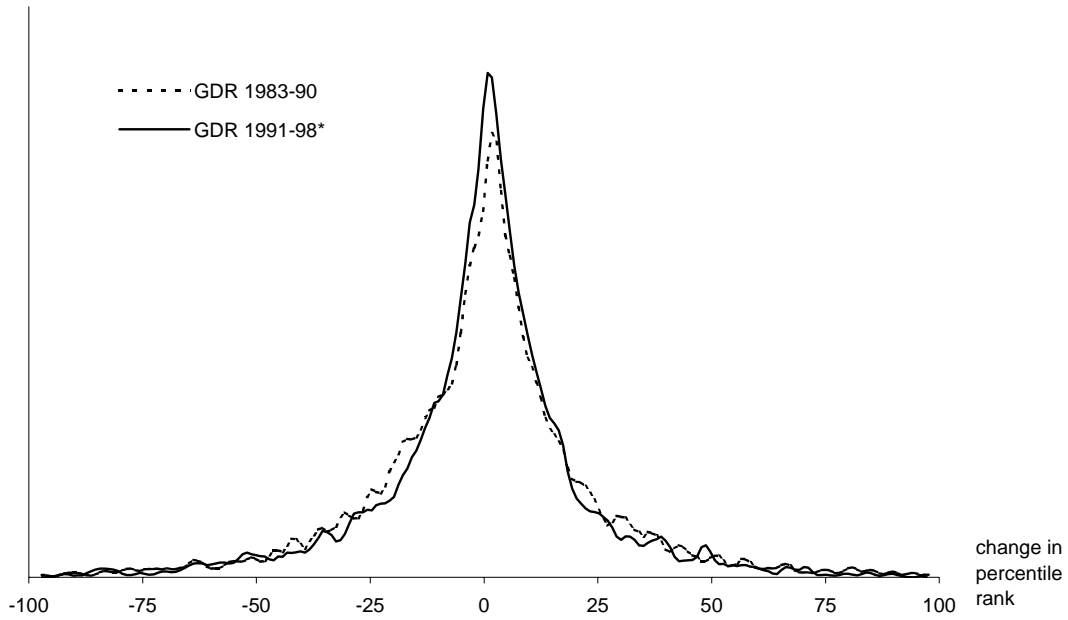
* 1991-1998 includes observations from former East Germany
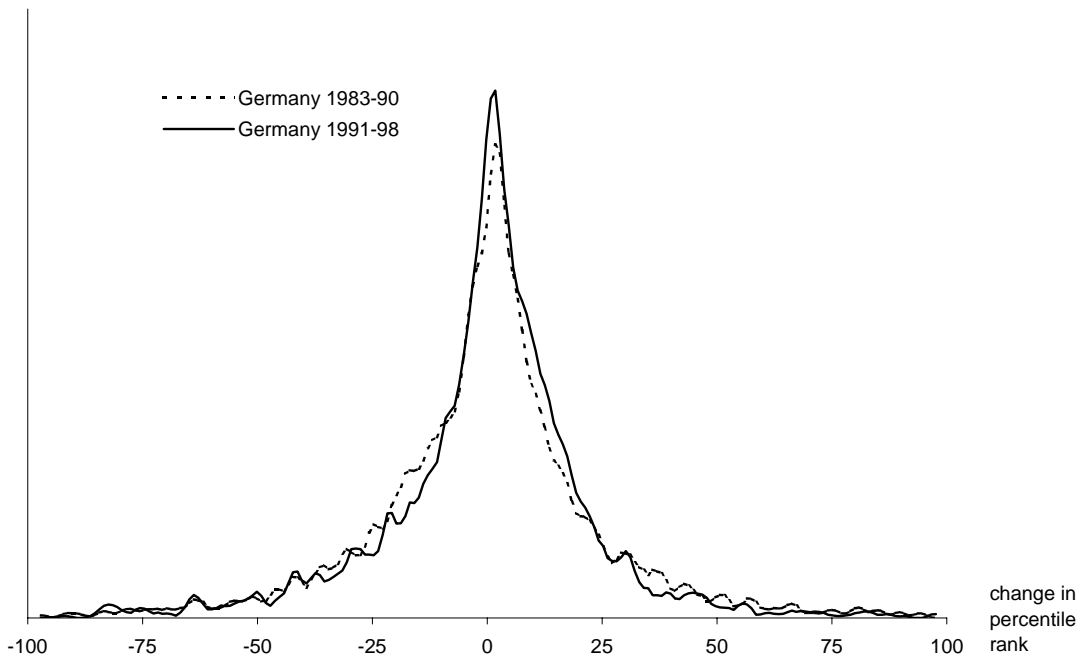
2C: West Germany only

Figure 2 (continued)

2D: United States and Germany, 1980s

- ·····US-1981-88
- —— Germany 1983-1990

change in
percentile
rank

-100   -75   -50   -25   0   25   50   75   100

2E: United States, Germany, and Great Britain, 1990s

- ·····US 1989-96
- —— Germany 1991-1998
- – – – Britain 1990-97

change in
percentile
rank

-100   -75   -50   -25   0   25   50   75   100

30
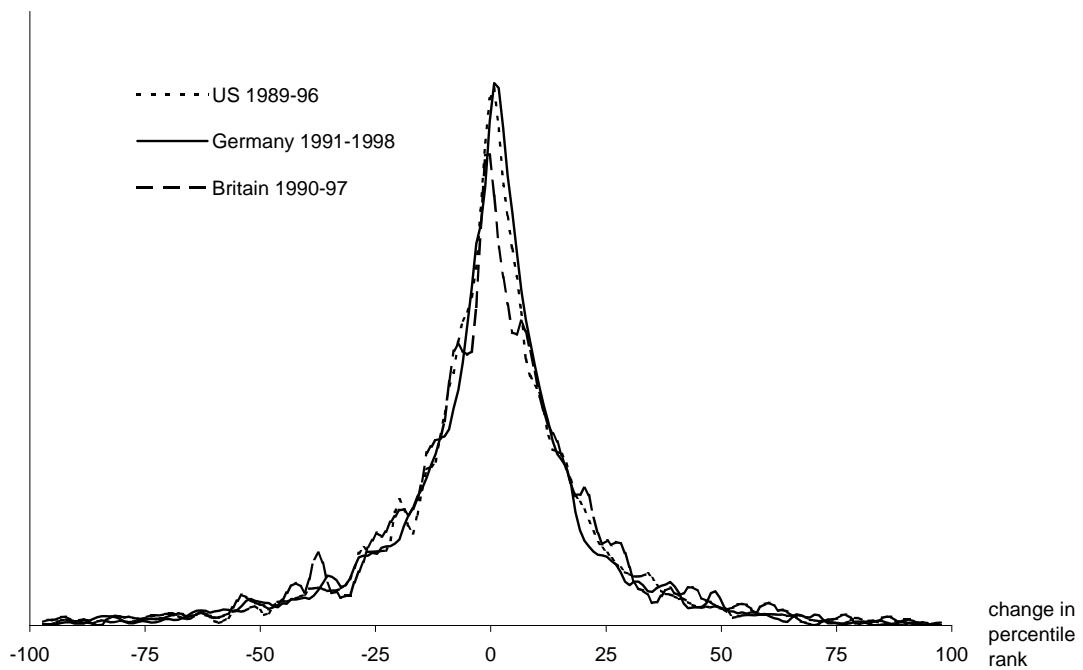
Figure 3. Decomposition of Annual Earnings Inequality
Panel 3A. United States

Variance of Logs
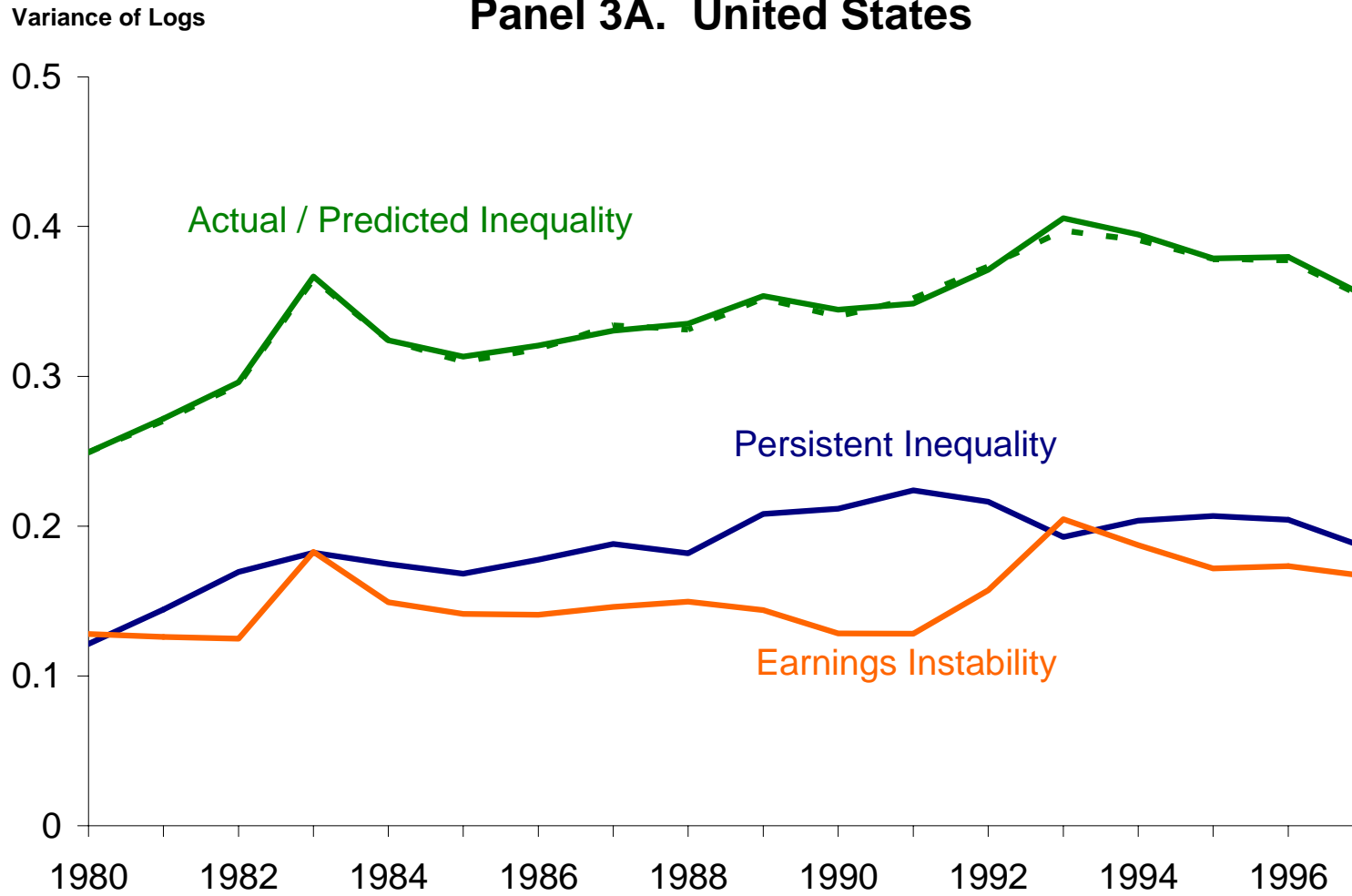
Figure 3. Decomposition of Annual Earnings Inequality
Panel 3B. West Germany

Variance of Logs

Actual / Predicted Inequality

Persistent Inequality

Earnings Instability

2
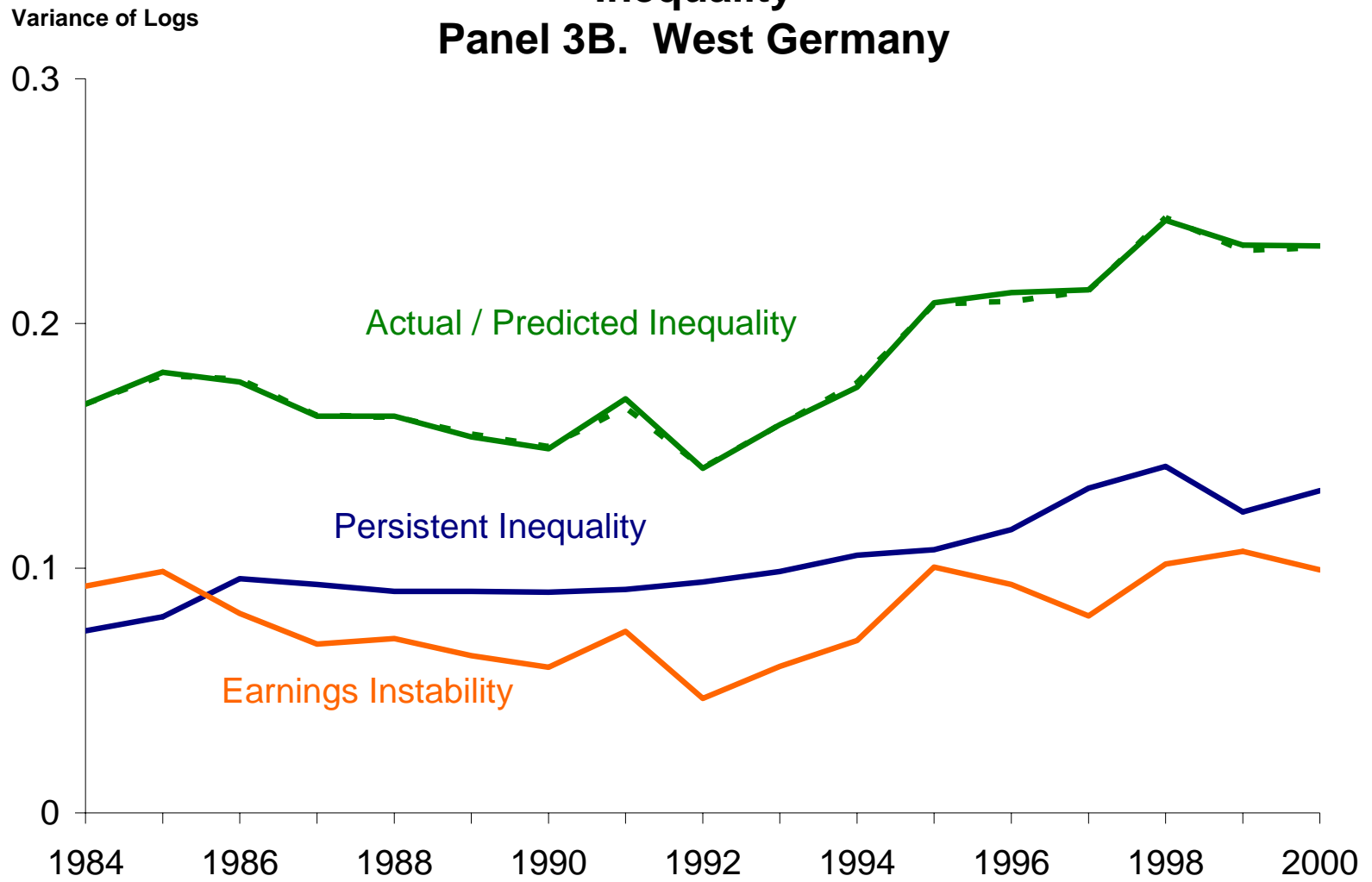
Figure 3. Decomposition of Annual Earnings Inequality
Panel 3C. Great Britain

Variance of Logs

Actual / Predicted Inequality

Earnings Instability

Persistent Inequality
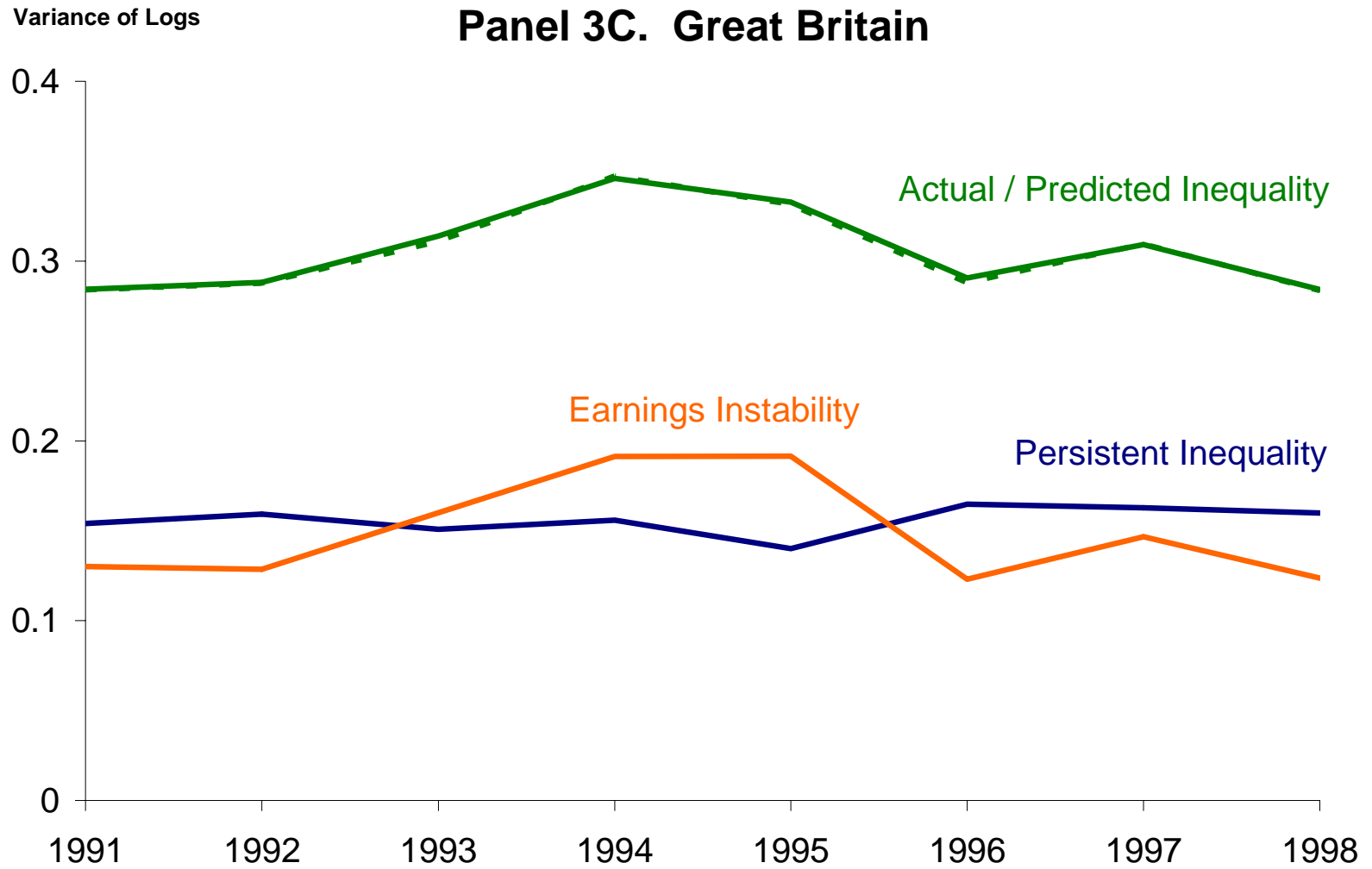
Figure 4. Panel A. Annual Earnings Inequality (predicted)

Variance of Logs

United States

Great Britain

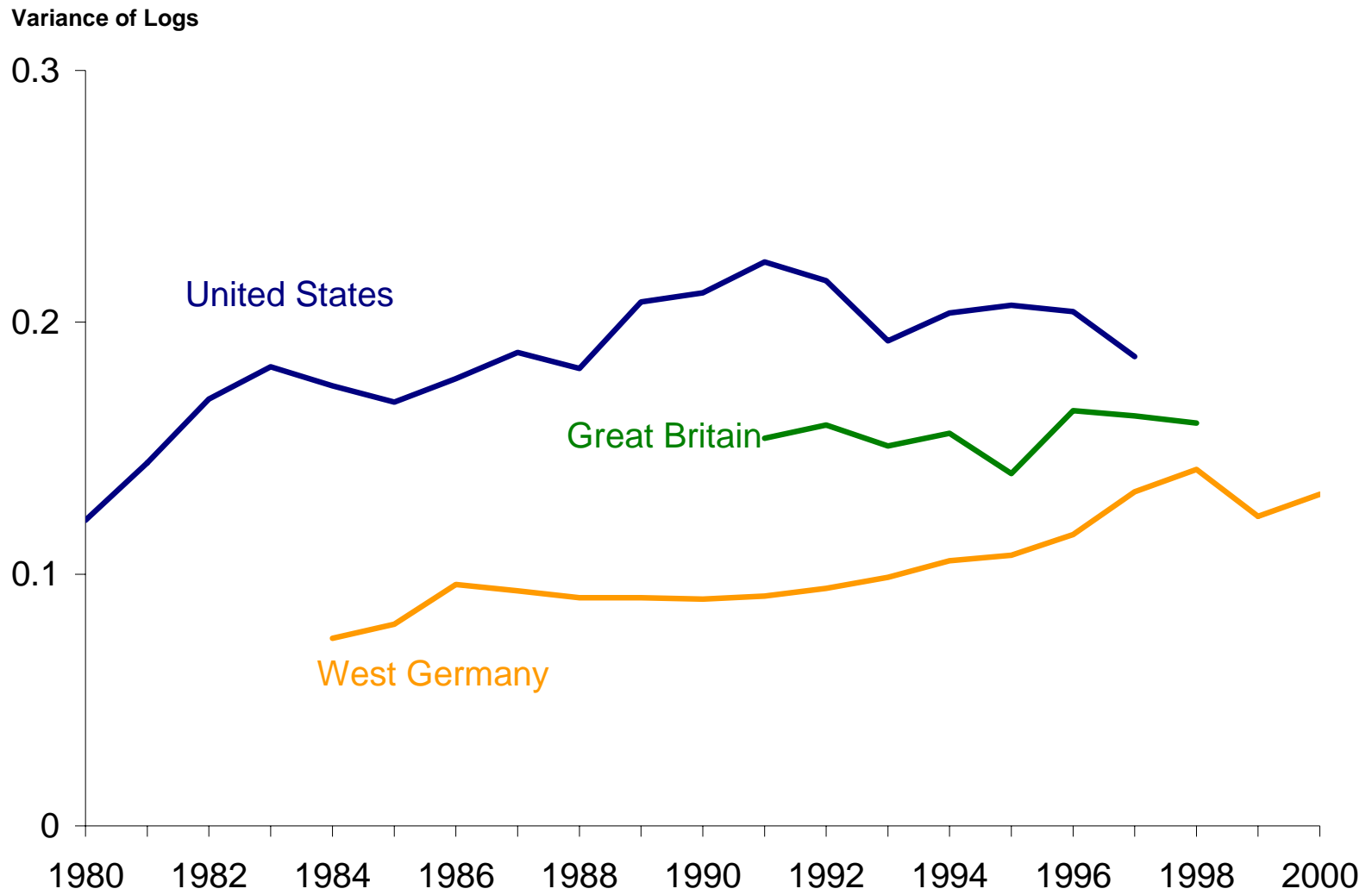West Germany
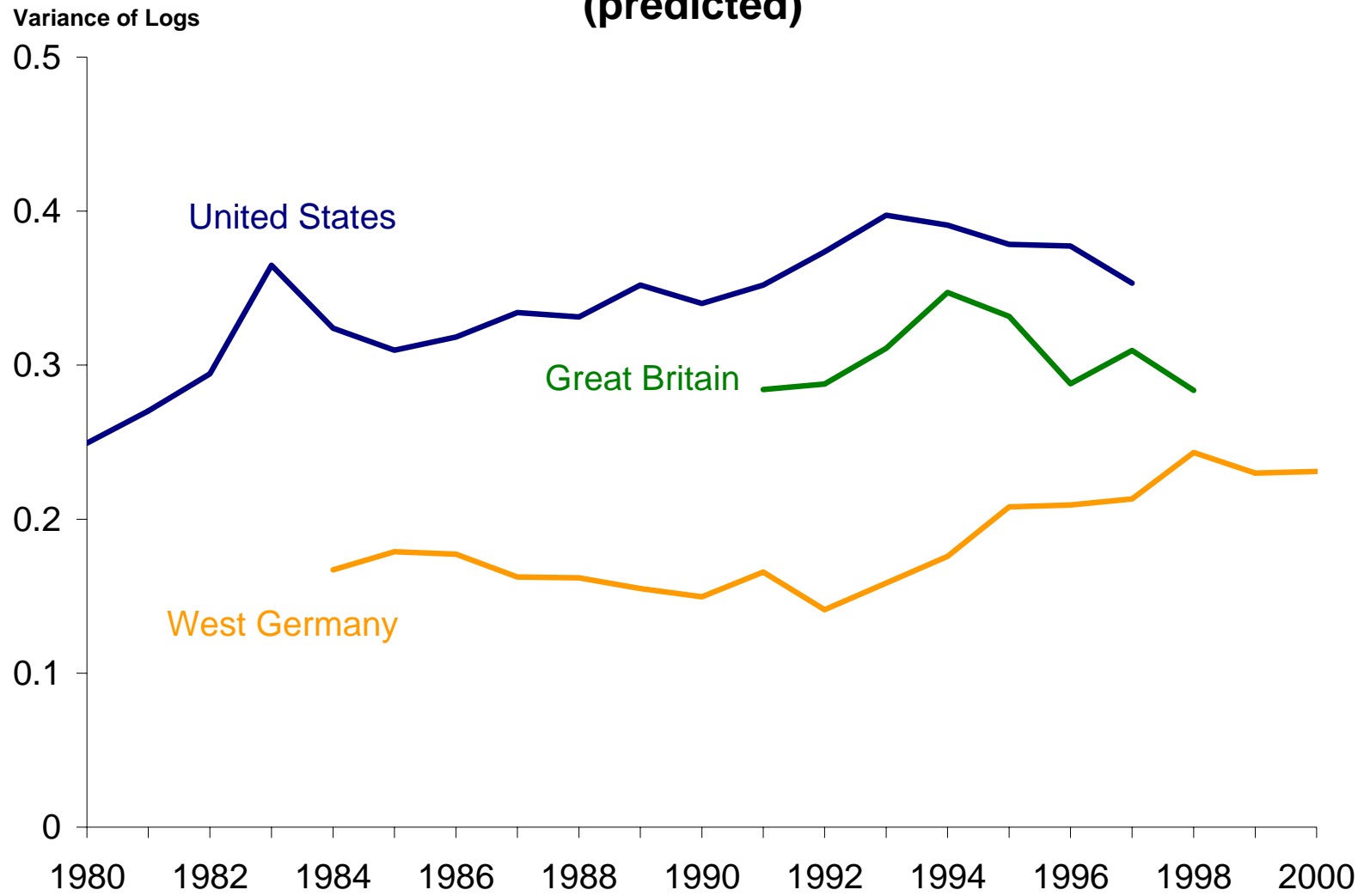
Figure 4. Panel B. Persistent Earnings Inequality

Variance of Logs

Figure 4. Panel C. Earnings Instability

Variance of Logs