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International Yield Curves and Principal Components Selection Techniques: An Empirical Assessment

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Abstract: En utilisant une base de données commune, nous proposons une comparaison empirique des techniques d'analyse par composantes principales (PC) récemment proposées par la littérature, pour la sélection de facteurs communs et locaux qui caractérisent la dynamique jointe des courbes de taux de plusieurs pays. Nous construisons une base de données journalière des courbes de taux de bonds du Trésor pour les États-Unis, l'Allemagne, l'Angleterre et le Japon, et cela en utilisant des critères communs pour filtrer les données d'obligations, pour garantir un niveau uniforme de liquidité et pour interpoler la fonction prix (d'actualisation). Ensuite, nous estimons chaque méthodologie PC proposée pour tous les sous-groupes de pays, sur des taux en niveau et en différence et cela à une fréquence hebdomadaire. Notre analyse empirique montre que les méthodologies proposées ne sélectionnent pas la même combinaison préférée des facteurs communs et/ou locaux. Nous identifions le critère de sélection de la variance expliquée comme une source importante de ce manque de consensus et recommandons de prendre en considération une technique statistique alternative de sélection pour identifier la combinaison optimale de ces facteurs.

Mots-clés: Base de données de courbes de taux Internationales, techniques d'estimation de la structure par terme de type Nelson-Siegel, technique de sélection par composantes principales, facteurs communs et locaux, variance expliquée.

Codes JEL: G12, E43, C52.

Abstract: Using a common database, we provide a controlled empirical comparison of recently-proposed principal component (*PC*) methods for selecting a combination of common and local factors that characterize the joint dynamics of multi-country term structures. We build a database of daily Treasury yield curves for U.S., Germany, U.K. and Japan, using common criteria to filter coupon bond data, to ensure liquidity, and to interpolate the discount function. We then estimate each proposed *PC* method for all subgroups of these countries, using both yield levels and yield differences at weekly frequency. We find, in general, that the proposed methods do not agree with one another on the preferred combination of common and/or local factors. We identify the explained variability decision criterion as an important source of this lack of agreement and recommend consideration of alternative statistical model selection techniques for the purpose of identifying common and local yield curve factors in international data.

Keywords: international Treasury yield curves database, Nelson-Siegel term structure estimation techniques, principal component selection techniques, common and local factors, explained variance.

JEL classification: G12, E43, C52.

Non-technical summary

To model a single country's term structure, the empirical literature generally finds that three to five latent factors are required to match the observed time variations of yield curve shapes and to explain Treasury returns. In the multi-country setting, on the contrary, we observe a lack of agreement, not only about the number of latent factors that are relevant to explain the joint dynamics of two or more countries, but also about their nature, namely how many of them are *common factors* (affecting yields in all countries) and how many are *local factors* (affecting yields in one country only).

On the one hand, some papers make assumptions (without empirical justification) about the number of common and local factors while, on the other hand, three papers in particular have adopted statistical methodologies for the extraction of international yield curve principal components in order to select a relevant combination of common and local factors. These methodologies, followed notably by Leippold and Wu (2007), Diebold, Li and Yue (2008) and Egorov, Li and Ng (2011), have reached different conclusions.

The purpose of this paper is to provide a controlled comparison of these three methods recently adopted by the international yield curve literature, recognizing that their different conclusions might be due to the fact that their empirical analyses have used different groups of countries, different sample periods and different data sets. To do this we build a database of daily international Treasury yield curves from the beginning of 1980 to the end of 2009, for four leading bond markets: the U.S., U.K., Germany and Japan, and then estimate using each proposed methodology with this database. We adopt for all countries the Gurkaynak, Sack and Wright (2007) criteria to filter coupon bond Treasury raw data, and to guarantee a uniform level of liquidity.

We then estimate each proposed *PC* method for all subgroups of these countries, using both yield levels and yield differences at weekly frequency. We find, in general, that the proposed methods do not agree with one another on the preferred combination of common and/or local factors. We identify the explained variability decision criterion as an important source of this lack of agreement and recommend consideration of alternative statistical model selection techniques for the purpose of identifying common and local yield curve factors in international data.

1 Introduction

To model a single country's term structure, the empirical literature generally finds that three to five latent factors are required to match the observed time variations of yield curve shapes and to explain Treasury returns [see Adrian, Crump and Moench (2012), Litterman and Scheinkman (1991), Dai and Singleton (2000, 2002), Duffee (2002, 2011), Cheridito, Filipovic and Kimmel (2002), Cochrane and Piazzesi (2005, 2008)].

In the multi-country setting, on the contrary, we observe a lack of agreement, not only about the number of latent factors that are relevant to explain the joint dynamics of two or more countries, but also about their nature, namely how many of them are *common factors* (affecting yields in all countries) and how many are *local factors* (affecting yields in one country only). On the one hand, some papers make assumptions (without empirical justification) about the number of common and local factors. For instance, Backus, Foresi and Telmer (2001), in order to study the forward premium anomaly between pairs of countries (among U.K., Germany and Japan), consider both the case of one common factor and one local factor for each country, and the case of only two common factors. Ahn (2004) proposes a two-country (U.S. and Germany) term structure model in which the international yield curve dynamics are driven, by assumption, by one common factor and one local factor for each country, and both factors are extracted by employing a principal factor analysis of the unconditional variance-covariance matrix of the yields.

On the other hand, three papers in particular have adopted statistical methodologies for the extraction of international yield curve principal components in order to select a relevant combination of common and local factors. These methodologies, followed notably by Leippold and Wu (2007), Diebold, Li and Yue (2008) and Egorov, Li and Ng (2011), have reached different conclusions.

Leippold and Wu (2007) [LW (2007), hereafter], working with U.S. and Japan swap and LIBOR rate changes observed weekly from January 1990 to December 1999, find no evidence for a common factor in these markets (in the sense that no dimensionality reduction is available by using common factors in a principal component analysis) and conclude that at most three local latent factors for each country's yield curves are needed. Egorov, Li and Ng (2011) [ELN (2011), hereafter] focus on the joint dynamics of the U.S. and European Union (E.U.) term structures and consider daily euro interest rates (Euribor) and U.S. interest rates (LIBOR) from July 1999 to June 2006. Their analysis leads them to choose two common factors and one local factor for each country [see Table 4 in ELN (2011)], finding this combination to be more satisfactory than the case with one common factor and one local factor for each economy. Diebold, Li and Yue (2008) [DLY (2008), hereafter], exploiting (and extending) a data base on zero-coupon government bond yields (for the U.S., U.K., Germany and Japan, from Brennan and Xia (2006)) observed monthly from September 1985 to August 2005, and generalizing to a global context the dynamic Nelson-Siegel yield curve model of Diebold and Li (2006), construct a hierarchical dynamic factor model for international yield curves

in which the term structure of each country may depend on local factors, and local factors may in turn depend on common factors (but the term structures may not directly load on the common factors). They select two local factors for each country along with two common factors, where each pair of factors consists of one level factor and one slope factor.

The purpose of this paper is to provide a controlled comparison of these three methods recently adopted by the international yield curve literature, recognizing that their different conclusions might be due to the fact that their empirical analyses have used different groups of countries, different sample periods and different data sets. To do this we build a database of daily international Treasury yield curves from the beginning of 1980 to the end of 2009, for four leading bond markets: the U.S., U.K., Germany and Japan, and then estimate using each proposed methodology with this database.

We adopt for all countries the Gurkaynack, Sack and Wright (2007) criteria to filter coupon bond Treasury raw data (taken from Datastream), and to guarantee a uniform level of liquidity. Indeed, like in Gurkaynack, Sack and Wright (2007), we exclude not only bonds with any option-like features and those with too short or too long maturities (i.e. not actively traded), but we also avoid the possible presence of an on-the-run/off-the-run liquidity premium by filtering out on-the-run and first off-the-run bonds. We then interpolate the discount function across residual maturities using the (parsimonious smoothed) Nelson and Siegel (1987) methodology. We thus obtain what we believe to be the first international zero-coupon Treasury yield curve data base at daily frequency with a homogeneous interpolation technique and a uniform level of bond liquidity (of an actively traded second off-the-run kind) across time, maturities and economies. These features facilitate a reliable comparison between different numbers and combinations of common and local yield factors. In addition, for completeness we have applied each of the three above-mentioned methodologies to all groups of countries using both yield levels and yield differences.

The results we have obtained are the following. If the LW (2007) approach is adopted, not only is the identification of the relevant number of local factors per country often ambiguous and completely different if we adopt interest rates in level or in difference, but also the attribution of any of them to a given country is often unclear. If we follow the ELN (2011) paper, we require (in general) one common factor, but the number of selected local factors per country changes if we consider different kind or different number of countries, or if we consider yield differences instead of yield levels. Lastly, the DLY (2008) methodology tends to always select two common (global level and slope) factors and two local (level and slope) factors per country, even if only one common factor is detected when we consider some sets of three countries and four countries with yield differences.

In summary, our empirical analysis highlights the systematic inability of the analyzed methodologies to clearly decide upon a preferred combination of common and/or local factors. We identify

the explained variability decision criterion as an important source of this lack of agreement and recommend consideration of alternative statistical model selection techniques for the purpose of identifying common and local yield curve factors in international data.

The paper is organized as follows. In Section 2 we present the international Treasury yield curve data set, the criteria we have adopted to build it, the associated descriptive statistics, pricing error analysis as well as a comparison with other relevant data sets used in the literature. In Section 3 we briefly present the three above mentioned *PCs*-based techniques while, in Section 4, exploiting our database, we detect a preferred combination of common and/or local factors for each technique across all groups of countries using both yield levels and yield differences. Section 5 concludes, while appendices gather all tables about the empirical assessment of the three principal component methods.

2 The International Treasury Yield Curves Database

One of the most important Treasury yield curve databases is the one recently proposed by Gurkaynak, Sack and Wright (2007) for the U.S. economy. In comparison with other well-known interest rates data sets [see Fama and Bliss (1987) and McCulloch and Kwon (1993)], three main features stand out and help determine their success: *a*) the high (daily) frequency of the (estimated) yields, *b*) the uniform level of liquidity among yields, over the entire maturity range, obtained using only second off-the-run Treasury notes and bonds (i.e., filtering out on-the-run and first off-the-run bonds) and *c*) a parsimonious parametric (Nelson-Siegel-Svensson) technique to estimate the discount function allowing, at the same time, to generate a rich family of yield curve shapes and to detect fundamental factors (such as macroeconomic variables, monetary policy interventions and announcements) behind its variation over time and in the cross-sectional dimensions.

In this section these three relevant features guide the construction of an international Treasury yield curve database for four leading bond markets (the U.S., U.K., Germany and Japan) and over a sample period from the beginning of 1980 to the end of 2009. In the international yield curve literature, the existing data do not satisfy all these important characteristics and, thus, we aim to fill this gap. For instance, the data in Ahn (2004) is given by monthly yield curves (from 1974:01 to 1988:12, for U.S. and Germany) estimated with spline techniques, while Diebold, Li and Yue (2008) propose (for U.S., Germany, U.K. and Japan) yield curve data (again) at monthly frequency (from 1985:09 to 2005:08)⁴, and they use the unsmoothed Fama and Bliss (1987) technique. Wright (2011) considers a yield curves panel data of ten countries, but the frequency of observations, the data filtering criteria and the interpolation techniques are different across the economies.

⁴This database is obtained extending the one proposed by Brennan and Xia (2006) and built using cubic splines [see also Tang and Xia (2007)].

2.1 Raw Data, Filters and Estimation Techniques

Raw data on all outstanding sovereign coupon bonds are collected from Datastream. This database consists of bond prices, accrued interest, coupon rates, redemption dates and issue dates, in local currency for the U.S., U.K., Germany and Japan. Following GSW (2007), we apply several data filters in order to consider only securities with similar levels of liquidity and to avoid special features (like callable features). The filters we apply are the following:

- We exclude all bonds with option-like features such as bonds with warrants, floating rate bonds, callable and flower bonds and index-linked bonds.
- We consider only securities with maturity, at the issuing date, at least one year and not more than fifteen years given that bonds in the "too short" or "too long" segment of the maturity spectrum may be not actively traded. We also exclude Treasury bills from the U.S. market all.
- For liquidity reasons, we consider at any date all outstanding bonds with a residual maturity from three months to fifteen years. Moreover, for each available maturity, we exclude the "on-the-run" and "first-off-the run" issues, which have greater level of liquidity with respect to the others [see, for instance, Fontaine and Garcia (2012)].

These filters lead us to construct an "off-the-run" international Treasury yield curve panel of data in which the liquidity level is uniform across the time series and cross-sectional dimensions. From the filtered database, the term structure of interest rates is estimated at daily frequency using the Nelson and Siegel (1987) (NS) methodology over the maturity spectrum covered by the available (filtered) data. We will post on the web a file containing the daily estimated yield curves as well as the estimated NS parameters making it possible to construct a time series of yields for any maturity. Nevertheless, we strongly suggest to generate only interest rates for maturities within the available filtered bond data⁵.

2.2 Estimated Yield Curve Data

Using the above mentioned filters and estimation technique, daily zero-coupon yields are calculated from January 1, 1980 to December 31, 2009, with the largest available range of residual maturities being from 3 months to 10 years and available only for the U.S. market. For the German bond market, we can calculate yields for the entire sample period only for maturities from 2 to 9 years, given that short-term bonds are almost always missing at the beginning of the sample. Nevertheless, starting from 1984, we recover securities with 6, 9 and 12 months of residual maturity.

⁵For instance, for Germany, Japan and U.K. (see Section 2.2 for more details), yields with residual maturity less than 12 months and more than 10 years are sometimes not available.

Regarding the Japanese market, bond data are extremely rare before 1982, hence we can not interpolate any term structure at that time. From 1982 to 1985, we frequently do not have securities with residual maturities from 3 to 9 months and from 8 to 10 years. It is only from 1986 on, that we have securities with residual maturity from 9 months to 10 years. For the U.K. bond market, coupon-bond data are missing at various times during the sample period, more often at short and at long maturities.

In summary, with the exception of the U.S. economy, the availability of coupon bonds is limited at the beginning of the sample period for Germany and Japan, and at various times for the U.K.. Nevertheless, when we move forward in time, coupon-bond data availability generally increases and, thus allows us to generate a panel data set of yields with a rich maturity spectrum.

2.3 Descriptive Statistics

Descriptive statistics of daily estimated zero-coupon yields highlight important features that are common across the four different Treasury markets (see Table 1 and Figures 1 and 2):

- *Yield curves are on average upward-sloping.* More precisely, the U.S., Japanese and German term structures are upward-sloping, with German yields presenting the largest average long-term spread. The U.K. yield curve is, on average, almost flat; the difference between the sample means of the one-year and the ten-year yields is only 0.8%. The Japanese yield curve (over the 1-year/10-year maturity range) has, among the four countries, the smallest average (between 2.5% and 3.6%), while U.K. has the highest average (ranging between 7% and 8%).
- *The term structure of marginal volatility is downward-sloping.* The empirical standard deviation of yields decreases with the residual maturity both for U.S. and Germany, with a difference between the one-year and the ten-year (nine-year for Germany) maturity at around 0.60%. Volatility decreases more slightly with the maturity in Japan (the difference is about 0.50%) and in the U.K. (the difference is around 0.34%). Overall, the U.S. and U.K. markets show the highest term structure of volatilities, while the German market shows the lowest. Generally (with the exception of the shortest Japan maturity) these term structures are more volatile at shorter than at longer maturities.
- *Yields are highly persistent and with strong cross-country correlations.* Yields are highly persistent in all four markets. Indeed, they have one-day, one-week and one-month lag autocorrelation averaging 0.987 and never below 0.93. Regarding the cross-country correlations, Figure 2 clearly show that for any pair of countries the level of correlation is large (between 0.5 and 0.95) and generally increasing with residual maturity.

Maturity (Months)	Median	Mean	St. Dev.	Min	Max	$\rho(1)$	$\rho(7)$	$\rho(30)$	Sample
U.S.									
3	5.32	5.70	3.37	0.10	17.81	0.99	0.99	0.97	7479
12	5.57	5.97	3.34	0.26	16.52	0.99	0.99	0.98	7479
36	6.00	6.49	3.15	0.69	15.46	0.99	0.99	0.98	7479
60	6.25	6.82	2.99	1.17	15.17	0.99	0.99	0.99	7479
84	6.43	7.03	2.90	1.65	15.02	0.99	0.99	0.99	7479
108	6.53	7.18	2.83	2.14	14.98	0.99	0.99	0.99	7479
120	6.57	7.23	2.80	2.32	14.97	0.99	0.99	0.99	7479
Germany									
3	4.15	4.71	2.36	0.16	12.98	0.99	0.99	0.97	6187
12	4.38	4.97	2.37	0.65	12.21	0.99	0.99	0.98	7747
36	4.91	5.36	2.13	1.53	11.47	0.99	0.99	0.99	7828
60	5.43	5.66	1.96	2.17	10.91	0.99	0.99	0.99	7828
84	5.87	5.88	1.84	2.61	10.46	0.99	0.99	0.99	7828
108	6.15	6.03	1.77	2.78	10.16	0.99	0.99	0.99	7828
120	6.97	7.03	1.44	2.87	10.10	0.99	0.99	0.96	4579
U.K.									
3	9.26	8.76	3.50	3.05	18.89	0.99	0.98	0.93	1456
12	7.00	7.75	3.41	0.53	15.54	0.99	0.99	0.96	6573
36	6.82	7.64	3.13	1.55	15.55	0.99	0.99	0.98	7345
60	6.95	7.59	3.06	2.09	15.55	0.99	0.99	0.98	7143
84	7.04	7.55	3.06	2.48	15.74	0.99	0.99	0.98	6851
108	5.91	7.17	3.21	2.86	16.17	0.99	0.99	0.98	5217
120	5.65	6.95	3.07	3.05	16.48	0.99	0.99	0.97	4601
Japan									
3	0.42	1.85	2.47	0.02	8.23	0.99	0.99	0.98	4697
12	0.76	2.59	2.66	0.01	8.38	0.99	0.99	0.99	7305
36	1.54	2.86	2.57	0.06	8.26	0.99	0.99	0.99	7305
60	2.37	3.19	2.49	0.15	8.43	0.99	0.99	0.99	7305
84	2.93	3.47	2.42	0.25	8.66	0.99	0.99	0.99	7305
108	3.15	3.58	2.25	0.38	8.42	0.99	0.99	0.99	7112
120	3.06	3.58	2.16	0.46	8.38	0.99	0.99	0.99	6903

Table 1: Summary statistics for bond yields of U.S., Germany, U.K. and Japan daily yields [Source: Datastream. Estimation method: Nelson and Siegel (1987)]. 'Sample' indicates the number of observations for each maturity, while $\rho(\ell)$ denotes the sample autocorrelation for a number of lags ℓ measured in days. The sample period starts January 1, 1980 for U.S., U.K. and Germany and from January 1, 1982 for Japan. It ends for all countries in December 31, 2009. Yields are in annual basis.

Figure 1: Treasury yield curves of U.S., Germany, Japan and U.K. from January 1986 to December 2009, and for residual maturities from 1 to 9 years. The term structure of interest rates for the *U.S.*, Germany and Japan are taken from our international Treasury yield curves database while *U.K.* term structure is taken from the Bank of England data set.

Figure 2: Cross-country yield level correlations (left column) and covariances (right column) for U.S., Germany, Japan and U.K. from January 1986 to December 2009.

2.4 Pricing Error Analysis

Following Gurkaynak, Sack and Wright (2007), we study the fitting performances of our data set by determining, for any country, the mean absolute (continuously compounded) yield to maturity error (difference between the observed yield and the interpolated one) for three maturity buckets. The short-term maturity bucket considers securities with residual maturities from 3 months to 2 years, the medium-term maturity bucket takes bonds with time-to-maturity from 2 to 5 years, while the long-term maturity bucket takes bonds with a residual maturity between 5 and 10 years.

We can observe from Figures 3 and 4 that, for U.S., Germany and Japan, the fitting errors are quite small and similar in magnitude to those shown by GSW (2007). The largest ones are concentrated at the beginning of the sample and, in particular, for the short-term maturity bucket. This fact is mainly due, as stated by GSW (2007) for the U.S. economy, to a lack of liquidity in bond markets at the beginning of the 80's and to the idiosyncratic nature of short-term securities. In other words, it seems that bond pricing anomalies have reduced across countries and maturities and through time probably because of more active and liquid markets. As far as the U.K. bond market is concerned, we immediately see from Figure 4 (left column) that fitting errors are very large at the beginning of the sample and are sometimes missing entirely because filtered and even raw data are not available.

Figure 3: Average absolute yield fitting errors for U.S. (left column) and Germany (right column) for three maturity buckets.

Figure 4: Average absolute yield fitting errors for U.K. (left column) and Japan (right column) for three maturity buckets.

2.5 A Comparison with other Data Sets

In this section, in order to further evaluate the reliability of our database, we will compare our daily international Treasury yield curves with existing data from other sources. In particular, we consider three different relevant data sets: the U.S. zero-coupon yields of GSW (2007), the U.K. term structures provided by the Bank of England and the international bond yields database kindly supplied by Diebold, Li and Yue (2008) [DLY (2008) hereafter].

The first database consists of daily U.S. Treasury yield curves estimates from 1961 to the present. Two parametric techniques are used to fit the term structure, namely the Nelson and Siegel (1987) one and the Svensson (1994) generalization, while Treasury quotes come from the Federal Reserve Bank of New York (FRBNY) and from CRSP. The second database consists of daily U.K. Treasury yields estimated from 1979 up to the present. A smoothed version of the cubic spline methodology, the Variable Roughness Penalty method [see Anderson and Sleath (2001) for further details] is used to interpolate bond data. The Treasury security data comes from sources including Bloomberg, Gilt Edged Market Association, Reuters and U.K. Debt Management Office. The third database consists of monthly U.S., U.K., German and Japanese Treasury yield curves estimated from 1980 through August 2005. The term structures are estimated by means of the unsmoothed Fama and Bliss (1987) methodology, while government bond data are taken from Datastream.

Given the different sample periods and frequency of observations of the above mentioned data sets, in order to provide a reliable statistical comparisons, we have selected (from our daily database) observations at both daily and monthly frequency for U.S. and U.K., and monthly frequency for Japan and Germany, covering common time intervals from beginning of 1982 to the end of 2009 in the former case while, in the latter case, the sample starts in January 1982 and ends in August 2005.

Let us consider the U.S. database first. On the basis of classical descriptive statistics, our zero-coupon daily yields estimates are very close to the ones provided by GSW (2007) (the results are available upon request from the authors). In particular, the correlations of bond yields between these two databases are always above 0.99, for all maturities and regardless of the adopted daily or monthly frequency of observations. Moreover, if we focus on the monthly frequency, a comparison with the DLY (2008) database is possible. Our estimates have slightly lower sample means and standard deviations, but correlations across yields (with the same residual maturity) are always higher than 0.98, with the only exception of the 10-year yields having correlations around 0.91 ⁶.

We next focus on the German and Japanese monthly databases. While our German database contains fewer observations of 10-year yields, we generally provide more observations of long and of short maturities than the data of DLY (2008). Regarding the Japanese market, our database is not as rich as the DLY (2008) database for short maturities, but we provide more observations for longer maturities. The German and Japanese yield curves have mean levels and standard deviations that are slightly larger in the DLY (2008) database with respect to our estimates. Nevertheless, correlations of bond yields between these two databases are in general always above 0.97.

Finally, as far as the U.K. bond market is concerned, on a daily basis, the Bank of England database is richer than ours. However, correlations of bond yields between the two sets of term structures are very high (around 0.98 for all maturities). If we consider the monthly frequency, correlations between our estimated yields and the ones provided by DLY (2008) are above 0.94, with the only exception for the 3-month yields, perhaps because of the limited number of observations and the different methodologies applied for the interpolation.

In summary, our estimated international zero-coupon yields closely track the ones built and/or adopted by other relevant papers and institutions. Now, in order to have a richer database (over both the time series and maturity dimensions) to exploit in the second part of the paper (focused on extracting principal components from multi-country yield curves), we will rely on the U.K. yield curve estimates provided by the Bank of England. In addition, this method is quite similar to Nelson and Siegel (1987) in terms of parameter flexibility and degree of smoothness, as also suggested by the above mentioned statistical comparison.

⁶This small difference may be induced by the presence of anomalous 10-year maturity bond prices which are not smoothed out by the unsmoothed Fama and Bliss (1987) methodology.

3 International Yield Curves and Principal Component Selection Techniques

The purpose of this section is to briefly present *PCs*-based techniques recently adopted in the literature for the purpose of selecting a preferred combination of common and local factors to characterize the joint dynamics of multi-country term structures of interest rates. In particular, the three relevant methodologies we deal with are those proposed by Leippold and Wu (2007), Egorov, Li and Ng (2011) and Diebold, Li and Yue (2008).

3.1 The Leippold and Wu (2007) Approach

Leippold and Wu (2007) [LW (2007), hereafter], working with U.S. and Japan swap and LIBOR rates observed weekly from January 1990 to December 1999, conclude that a common factor among these two markets does not exist and suggest three local latent factors for each yield curve. The decision strategy they follow to reach that conclusion is based on the following three steps.

First, using the correlation matrix estimated from interest rate changes, they perform a principal component analysis on the yield curve database of each country and on the pooled data set of the two countries, thus extracting single-country principal components we denote *PCs* and multi-country principal components denoted $PC^{(c)}$ s, respectively (we focus here on their analysis of interest rates). From this analysis, they check how many principal components are required in each case to explain a large fraction (over 90%) of the interest rate variance. On the basis of this analysis they do not find a dimensionality reduction by pooling the data given that two *PCs* are required to explain U.S. interest rates, three *PCs* are required for Japan's interest rates, and five $PC^{(c)}$ s are required for the pooled data set of interest rates [see Table II in LW (2007)]. Because there is no reduction, from the factors required with local factors only, to the five factors required by the pooled analysis, they conclude that there is no dimensionality reduction achievable through the use of common factors.

Second, they regress each yield-to-maturity series on each of the first seven $PC^{(c)}$ s, and report the associated percent variance explained, R^2 , along with the average percent explained (over the maturity spectrum of each country) which we denote R_a^2 [see Table III in LW (2007)], and they identify the major contributing country for each $PC^{(c)}$ s according to which country has the larger R_a^2 , with the sole exception of the fifth factor (which they identify as a currency movement factor largely unrelated to interest rates).

Third, they explore the nature of each factor on the basis of the pattern of correlations it has with the yields of each country [see Table IV in LW (2007), where this table represents the signed square root of the R^2 values from their Table III] finding, for example, that the third and fourth $PC^{(c)}$ s are associated with the slopes of the yield curves. They conclude that at most three

local factors for each country are needed to summarize its interest rate movements, and that no dimensionality reduction is available by using common factors. We denote this strategy as the *LW*-approach.

3.2 The Egorov, Li and Ng (2011) Approach

Egorov, Li and Ng (2011) [ELN (2011), hereafter] focus on the joint dynamics of the U.S. and European Union (E.U.) term structures and consider daily euro interest rates (Euribor) and U.S. interest rates (LIBOR) from July 1999 to June 2006. The decision strategy they follow to select a preferred combination of local and common factors is based on the following three steps.

First, they extract local PC s and common $PC^{(c)}$ s from each economy and from the pooled term structures, respectively, and they find (in contrast with LW (2007)) that three $PC^{(c)}$ s explain more than 99% of the total variance in the pooled Euribor and LIBOR data set [see Table 2 in ELN (2011)]. Second, in order to establish how many factors are needed to explain the variation of the two curves, they regress each single-country PC on the first six $PC^{(c)}$ s and they observe that the first two $PC^{(c)}$ s are associated with the first local factor of each country, while the third and fourth $PC^{(c)}$ s contain information about the second local factors in the LIBOR and Euribor markets, respectively. They also find that the fifth (sixth, respectively) $PC^{(c)}$ is strongly linked with the third local factor in each economy. They find four factors sufficient based on the R^2 from these regressions, which show that the first four $PC^{(c)}$ s capture 99.9% of the variation in each of the first two LIBOR- and first two Euribor- PC s [see Table 3 in ELN (2011)], while using just the first three $PC^{(c)}$ s captures only 83.37% of the second local Eurobor factor, which they declare insufficient. Third, in order to choose how many of these four factors are common and how many are local, they run a principal component analysis on the residuals obtained from regressing each country's term structure on the first one and on the first two common principal components. The PC s of each country residuals (denoted $PC^{(\ell)}$ s) are identified as local factors and the selected mix of common and local factors is the one such that a large percentage (around 90%, being 90.56% for LIBOR and 88.23% for Euribor after regressing on two common factors) of the variation of these residuals is explained (while 60.76% is declared insufficient for one common factor with one local LIBOR factor). We will take as their implicit criterion that at least 85% be explained. This analysis leads them to choose two common factors and one local factor for each country [see Table 4 in ELN (2011)], this combination being more satisfactory than the case with one common and one local factor for each economy.

Nevertheless, an inspection of their Table 4 also highlights that: *i*) in the LIBOR market, the (six-factor) case of two common and two local factors (for each country) dominates the (five-factor) case of one common and two locals, and that both specifications outperform the selected four-factor case (increasing the percent variance explained of residuals from 90.96% to 94.28% or

97.87%); *ii*) in the Euribor market, choosing five- or six-factors perform about equally well (98.25% or 97.63%) and both dominate the previously suggested four-factor case (88.23%). This analysis suggests that the selected specification is potentially missing relevant information, with respect to the two above mentioned larger dimensional cases, and the proposed decision strategy does not provide an objective statistical criterion. In other words, and in contrast with LW (2007), the two competitive specifications both suggest that two $PC^{(\ell)}$ s for each economy are required, while the decision's uncertainty concerns the number of $PC^{(c)}$ s (one vs two). This selection strategy is denoted *ELN*-approach.

3.3 The Diebold, Li and Yue (2008) Approach

Diebold, Li and Yue (2008) [DLY (2008), hereafter], exploiting (and extending) a monthly data base on zero-coupon government bond yields (for the U.S., Germany, Japan and U.K.) of Brennan and Xia (2006), and generalizing to a global context the dynamic Nelson-Siegel yield curve model of Diebold and Li (2006), construct a hierarchical dynamic factor model for international yield curves in which the term structure of each country may depend on local factors, and local factors may in turn depend on common factors (but a country's term structure does not directly depend on common factors). The sample period is from September 1985 to August 2005 and the strategy they follow to select common and local factors is based on the following steps.

First, from each yield curve they extract a level and slope factor by applying the first step of the Diebold and Li (2006) two-step procedure. Second, they observe visually that the four level factors (one for each country) exhibit commonality in their dynamics, as do the four slope factors. To assess this commonality, they conduct a *PCA* for each group. They infer the existence of a dominant global level factor from the fact that the first level *PC* explains just over 90% of the total variation of the country level factors, and infer an important global slope factor from the fact that the first slope *PC* explains about 50% of the total slope variation.

Their hierarchical dynamic factor model allows each country's yield curve to depend on its own level and slope factors where each of these in turn depends on the global factor (level or slope respectively), thereby constructing a model by assumption with two common factors along with two local factors for each country. Each country has direct access to only two factors (its own level and slope) because the common factors act indirectly (through the local factors) and a country is not permitted to load directly on a common factor. While the dimensionality of their model (level and slope for common and for each country, factors) exceeds the dimensionality of the data (level and slope for each country series), the inclusion of these two additional global factors allows their model to represent common, correlated movements. However, as estimated, they find that each of the two global components is closely associated with just one country's movements: Germany's level factor closely matches the global level factor, while the U.K.'s slope factor loads entirely on

the global slope factor⁷.

4 Empirical Assessment and Comparison

The purpose of this section is to use the international Treasury yield curve data set presented in Section 2 to provide a controlled empirical comparison of the three PC s-based techniques presented in the previous section. Using weekly observations of the U.S., U.K., German and Japanese yield curves from January 1, 1986 to December 31, 2009, results (summarized in Table 2) are presented for all groups of countries, and for both yield levels and yield differences in the following three sections.

4.1 The LW -approach

As far as the LW -approach is concerned, if we consider pairs of countries as well as yield levels, the first step suggests that three $PC^{(c)}$ s always explain more than 99% of joint interest rates variation while, if we consider yield differences, the number of factors rises to five or six [see Table 3] as in LW (2007)⁸. If the second step of the LW -approach is applied to yield levels, we have that the majority of the information (R_a^2) is concentrated in $PC_1^{(c)}$, two or three other ones [namely, $(PC_2^{(c)}, PC_3^{(c)})$ for $U.S.-U.K.$, $GER-U.K.$, $GER-JAP$ and $U.K.-JAP$, and $(PC_2^{(c)}, PC_3^{(c)}, PC_4^{(c)})$ for $U.S.-GER$ and $U.S.-JAP$] have a R_a^2 between 0.10 and 0.01, while the remaining ones seem to be irrelevant, having an associated R_a^2 around zero. In this case we should select, in general, the above mentioned three or four $PC^{(c)}$ s only, and the attribution to each of them as local factor of a given country would not be straightforward, given that the R_a^2 across countries are of similar magnitudes in several cases [see, for instance, $PC_3^{(c)}$ in the $U.S.-U.K.$ case where we have $R_a^2 = 0.01$ for both countries, or $PC_2^{(c)}$ in the $U.S.-GER$ and $GER-JAP$ cases where these two groups countries show the same $R_a^2 = 0.11$ and $R_a^2 = 0.05$, respectively; see, for further details, Panel A of Tables from 4

⁷While interpreting the estimates from their Table 4, Diebold, Li and Yue (2008) note that each of the two global components (level and slope) is closely associated with just one country's movements. Germany's level factor closely matches the global level factor, as may be seen from the fact that its loading of 0.26 (first column of equations, second country-level-factor equation) is the largest of any country's level factor loading on the global level factor, while the apparently non-significant German-specific level factor loading of 0.07 (second column of equations in that same row) contributes little if any persistence in contrast to the other countries in this group. Similarly, the U.K.'s slope factor loads most strongly on the global slope factor with its loading of 0.77 (first column of equations, last country-slope-factor equation) which is the largest of any country's slope factor loading on the global slope factor, while the apparently non-significant U.K.-specific level factor loading of 0.03 (second column of equations in that same row) contributes little if any persistence in contrast to the other countries. In addition, neither Germany's nor Japan's slope factor appears to load significantly on the global slope factor, based on estimated loadings of 0.06 and 0.03 with posterior standard deviations 0.05 and 0.03 respectively (first column of equations, second and third country-slope-factor equation).

⁸While LW (2007) also include results with relevant currency exchange rates variations, we are using criteria as they specified for choosing the number of factors based on interest rates only. When we implement the LW -approach including also exchange rate variation time series, we reach conclusions similar to those highlighted in Section 4.1. This analysis is available upon request from the authors.

Countries	Techniques	Yield levels					Yield differences				
		r_c	r_1	r_2	r_3	r_4	r_c	r_1	r_2	r_3	r_4
U.S.-U.K.	<i>LW</i>	0	1 or 2	1 or 2			0	3	3		
	<i>ELN</i>	2	1	2			1	2	2		
	<i>DLY</i>	2	2	2			2	2	2		
U.S.-GER.	<i>LW</i>	0	2 or 3	1 or 2			0	3	3		
	<i>ELN</i>	1	1	2			1	2	2		
	<i>DLY</i>	2	2	2			2	2	2		
U.S.-JAP.	<i>LW</i>	0	2	2			0	3	3		
	<i>ELN</i>	1	1	1			1	2	2		
	<i>DLY</i>	2	2	2			2	2	2		
GER.-U.K.	<i>LW</i>	0	2	1			0	3	3		
	<i>ELN</i>	1	2	2			1	2	2		
	<i>DLY</i>	2	2	2			2	2	2		
GER.-JAP.	<i>LW</i>	0	1 or 2	1 or 2			0	3	3		
	<i>ELN</i>	1	2	2			1	2	2		
	<i>DLY</i>	2	2	2			2	2	2		
U.K.-JAP.	<i>LW</i>	0	1, 2 or 3	0, 1 or 2			0	3	3		
	<i>ELN</i>	1	2	2			1	2	2		
	<i>DLY</i>	2	2	2			2	2	2		
U.S.-U.K.-GER.	<i>LW</i>	0	1	2 or 3	1 or 2		0	3	3	3	
	<i>ELN</i>	1	1	2	2		1	1	2	2	
	<i>DLY</i>	2	2	2	2		2	2	2	2	
U.S.-U.K.-JAP.	<i>LW</i>	0	2 or 3	2 or 3	1		0	3	3	3	
	<i>ELN</i>	1	1	2	1		1	2	2	2	
	<i>DLY</i>	2	2	2	2		1	2	2	2	
U.S.-GER.-JAP.	<i>LW</i>	0	2	1 or 2	1 or 2		0	3	3	3	
	<i>ELN</i>	1	1	2	1		1	1	2	2	
	<i>DLY</i>	2	2	2	2		1	2	2	2	
U.K.-GER.-JAP.	<i>LW</i>	0	2	1 or 2	1 or 2		0	2	3	4	
	<i>ELN</i>	1	2	2	2		1	2	2	2	
	<i>DLY</i>	2	2	2	2		1	2	2	2	
U.S.-U.K.-GER.-JAP.	<i>LW</i>	0	2	2	2	0	0	3	2 or 3	2, 3 or 4	3 or 4
	<i>ELN</i>	1	1	2	2	1	1	1	2	2	2
	<i>DLY</i>	2	2	2	2	2	1	2	2	2	2

Table 2: For any given set of $n = 2, 3$ and 4 countries, and for both yields levels and yield differences, we report the number r_c of common and the number r_j of local factors (of country j in the group) suggested by each of the three *PC*-based techniques, namely *LW*, *ELN* and *DLY*. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

to 9]. If we consider yield differences, we have that, even if the information is less concentrated in $PC_1^{(c)}$, we still need to consider as relevant a factor with $R_a^2 \approx 0.01$ if we want to have 6 $PC^{(c)}$ s to share as local factors for the two countries. In addition, while labeling any one of these six $PC^{(c)}$ s as local factor of a given country is less difficult in general, in some cases (e.g., *GER-U.K.*) again the R_a^2 s across countries are quite similar to one another [see Panel A of Table 7].

In the 3-country case, the first step shows that the first 4 or 5 $PC^{(c)}$ s are required to explain more than 99% of variability of interest rates levels, while the first 8 or 9 $PC^{(c)}$ s are necessary for yield differences [see Table 10]. Now, if the second step is applied to the levels, we have that again the identification of any of the relevant (i.e., $R_a^2 \geq 0.01$) $PC^{(c)}$ s as a local factor of a given country

would not be easy for the same reasons presented in the 2-country case and the associated number of local factors for a given country may be in contradiction with the the number typically suggested by a single-country principal component analysis. For instance, in the case *U.S.-U.K.-GER* this strategy would select just one factor for the *U.S.* and would be unable to decide if $PC_4^{(c)}$ is a *U.K.* or *GER* factor being $R_a^2 = 0.02$ for both countries. Again, if we take *U.S.-U.K.-JAP*, $PC_4^{(c)}$ shares the same $R_a^2 = 0.01$ across the three countries [see Panel A of Tables from 11 to 14 for further details]. This problem *seems to be solved* if we work with yield differences, given that we find it easier to detect three local factors for each country among the relevant $PC^{(c)}$ s. Nevertheless, in the set of three countries *U.K.-GER-JAP*, Japan receives four factors, Germany receives three factors and *U.K.* only two (namely, $PC_6^{(c)}$ and $PC_9^{(c)}$), with $PC_6^{(c)}$ providing to the latter economy an $R_a^2 = 0.04$ only slightly larger than the one provided to *GER* ($R_a^2 = 0.03$). The labeling is also not clear in the *U.S.-U.K.-GER* case, where $PC_4^{(c)}$ (respectively, $PC_5^{(c)}$) has a R_a^2 of 0.06 (respectively, 0.03) for *GER* and of 0.05 (respectively, 0.04) for *U.K.*.

In the 4-country case, we have that 5 or 6 $PC^{(c)}$ s are required for yield levels, while this number ranges between 11 and 12 for yield differences [see Table 15]. The second step [see Table 16] provides two local factors to *U.S.*, *U.K.* and *GER* and nothing to Japan if the level of interest rates is studied while, if we consider yield differences, we find difficult to associate $PC_5^{(c)}$ (respectively, $PC_7^{(c)}$) to a given country given that the R_a^2 is the same between Germany and Japan (respectively, *U.K.* and Germany). In summary, if the *LW*-approach is adopted, we find ambiguity both in the identification of the relevant number of local factors per country, and also in their attribution to specific countries.

4.2 The *ELN*-approach

In this Section we apply the *ELN* (2011) approach to our term structure database for all possible sets of countries, using both yield levels and yield differences. For the 2-country case (see Tables 17 to 19) we find for both yield levels and yield differences, and for each pair of countries, that the first four (respectively, six) $PC^{(c)}$ s always explain a large R^2 of at least 99.65% (respectively, 99.61%) of the interest rate variations of the first two (respectively, three) local PC s of both countries (second step of the analysis, presented in Tables 17 and 18). However, note that when we apply the third step by computing principal components (separately for each country) of the residuals from yields regressed on one and on two common factors, we are not always able to achieve the implicit *ELN* (2011) criterion of at least 85% of the variance explained by the first principal component $PC^{(\ell)}$ from this residual analysis. The average percent variance explained is just 76.78% across all cases in Table 19: for yield levels from one common factor to two the average percent variance explained increases from 78.64% to just 80.99%, while for yield differences the average percent explained decreases from 76.43% to 71.06%. Thus a case-by-case analysis is required.

To complete this third step for two countries, we note from Table 19 that just four of the 48

entries with one $PC^{(\ell)}$ exceed the 85% criterion and these are all with yield levels. For the U.S. with Japan we may choose just three factors: one common factor and one local factor for each country, because the first local U.S. factor explains 85.74% of the variance of the regression residuals from one common factor, and the first local Japan factor similarly explains 89.78%, which are both above the implicit ELN criterion of at least 85%. For the U.S. with Germany, we may choose one local U.S. factor (because it explains 85.57%) and two local German factors (which together explain 99.15%) for a total of four factors including the one common factor. The remaining entry that exceeds the 85% criterion involves the U.S. with the U.K. and does not allow us to meet the criterion with only four factors because this entry requires two common factors with one local U.S. factor (explaining 86.24%) but with two U.K. factors because the 85% criterion is not met with just one U.K. $PC^{(\ell)}$. All of the remaining nine (out of twelve) pairs of countries require five factors (one common and two local for each country will meet the criterion).

For the three-country case (see Tables from 20 to 22) we find for both yield levels and yield differences, and for each group of countries, that the first six (respectively, nine) $PC^{(c)}$ s always explain a large R^2 of at least 99.02% (respectively, 99.52%) of the interest rate variations of the first two (respectively, three) local PC s of each country (second step of the analysis, presented in Tables 20 and 21).

When we apply the third step with three countries by computing principal components (separately for each country) of the residuals from yields regressed on one and on two common factors, we are always able to achieve the implicit ELN (2011) criterion of at least 85% of the variance explained if we take the first two principal components $PC^{(\ell)}$ s from this residual analysis along with one common factor, for a total of seven factors (one common plus two local for each country) using Table 22. In five of the eight cases we can use fewer factors. With yield levels, for the U.S. with the U.K. and Japan we can use five factors (one local U.S., two local U.K., and one local Japan, along with one common factor) because the first $PC^{(\ell)}$ for the U.S. explains more than the required 85% at 87.07%, and the U.K. explains 89.77%. Similarly, five factors suffice for the U.S. with Germany and Japan for yield levels (U.S. at 90.93% and Japan at 88.79%). Six factors suffice with both yield levels and yield differences for the U.S., the U.K., and Germany (because the first U.S. $PC^{(\ell)}$ explains 86.31% for levels and 85.26% for differences). The final case is for yield differences with the U.S., Germany, and Japan (85.50% explained by the first U.S. $PC^{(\ell)}$).

For the case of all four countries (see Tables from 23 to 25) we find for both yield levels and yield differences, that the first eight (respectively, twelve) $PC^{(c)}$ s explain a large R^2 of at least 99.81% (respectively, 99.47%) of the interest rate variations of the first two (respectively, three) local PC s of each country (second step of the analysis, presented in Tables 23 and 24). Applying the third step using Table 25, for yield levels we find that seven factors are required: one common factor, one local factor for the U.S. (90.35%) and for Japan (88.88%), and two local factors for each

of the U.K. and Germany (for which the first $PC^{(\ell)}$ did not explain at least the 85% required). For yield differences, we find that eight factors are required: one common factor, one local factor for the U.S. (86.50%) and two local factors for each of the U.K., Germany, and Japan.

In summary, for yield levels with two countries, we need either three factors (one pair of countries), four factors (two pairs of countries) or five factors (three pairs), while for yield differences we need five factors with all six pairs of countries. For groups of three countries, we need five factors for two groups with yield levels, six factors for one group with yield levels and two groups with yield differences, and seven factors in the remaining cases (one group with levels and two groups with differences). For all four countries taken together, we need seven factors for levels and eight factors for yield differences.

4.3 The *DLY*-approach

Coherently with the implementation of the two previous methodologies, we have applied this third approach to each group of countries in our database, with both yield levels and yield differences (see Table 26).

With yield levels, we seem to have a "global dominant level factor" for all groups of countries, although in only 9 of the 11 groups does the percent variance explained actually exceed the 90% threshold (it is close otherwise, at 88.97% for the U.S. with Germany, and 88.51% for the U.S. with Germany and Japan). We also always have one important global slope factor, with all 11 groups exceeding the 50% threshold.

With yield differences in no case do we reach the 90% threshold for a "global dominant level factor." The average percent variance explained by the first principal component for the level factors (averaged across all groups of countries) is just 60.44%, with a maximum of 72.24% for the U.S. with Germany, down from the average of 92.38% explained the level factors of yield levels. This suggests that, when analyzing yield differences, the global level factor might be demoted from "dominant" to "important" but would still be included in the hierarchical model. We have an "important global slope factor" exceeding the 50% threshold in 7 of 11 groups of countries (the exceptions are larger groups: U.S.-U.K.-Japan at 41.95%, U.S.-Germany-Japan at 42.76%, U.K.-Germany-Japan at 42.94%, and 38.08% for all four countries). This appearance of a decrease in the percent variance explained with larger groups (with yield differences and slope factors) is confirmed by a very highly significant regression ($p = 0.000743$) of percent variance explained on the number of countries in the group. However, the *DLY* model does not specify how to proceed in the absence of evidence of an "important global slope factor" for yield differences.

5 Conclusions and Further Developments

We have presented an extensive and detailed comparison of principal component-based techniques recently adopted for the purpose of selecting a preferred combination of common and/or local international yield curves factors. Reliability of this empirical assessment is obtained by building a database of daily Treasury yield curves for U.S., Germany, U.K. and Japan, using common criteria to filter coupon bond data, to ensure liquidity, and to interpolate the discount function.

Three relevant selection methodologies [namely, Leippold and Wu (2007), Egorov, Li and Ng (2011) and Diebold, Li and Yue (2008)] are applied to all subgroups of these countries, using both yield levels and yield differences at weekly frequency. Our empirical exercise shows the systematic inability of these methodologies to clearly detect a preferred combination of common and/or local factors that describe the joint dynamics of a given set of multi-country yield curves. We identify the explained variability decision criterion as a relevant source of this lack of agreement and suggest consideration of alternative statistical model selection techniques for the purpose of identifying common and local yield curve factors in international data.

Appendix 1: The *LW*-Approach.

The 2-Country Case

1st step : Principal Component Analysis of International Bond Markets

Table 3: We report principal component analysis of the term structure of interest rates of pairs of countries taken separately and jointly. The first column lists the number of principal components (four for a single country, and nine for any 2-country case), while the rest of the table is divided into three vertical blocks. Each of the first and second blocks represents an individual country, while the third block represents the two countries jointly. The first and second columns (third and fourth, respectively) of each block report marginal and cumulative percent variance explained for yield levels (yield differences, respectively). For each country we use weekly yields observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

	<i>PC_s</i>								<i>PC^(c)_s</i>			
	<i>U.S.</i>				<i>U.K.</i>				<i>U.S. – U.K.</i>			
	Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	97.22	97.22	93.55	93.55	98.10	98.10	89.96	89.96	93.48	93.48	65.16	65.16
2	2.70	99.93	5.42	98.97	1.80	99.90	8.81	98.77	4.74	98.22	26.75	91.91
3	0.07	100.00	0.88	99.85	0.09	99.99	1.09	99.87	1.36	99.57	4.63	96.54
4	0.00	100.00	0.14	99.99	0.01	100.00	0.12	99.99	0.35	99.93	2.33	98.88
5	-	-	-	-	-	-	-	-	0.05	99.98	0.56	99.44
6	-	-	-	-	-	-	-	-	0.02	100.00	0.42	99.86
7	-	-	-	-	-	-	-	-	0.00	100.00	0.07	99.93
8	-	-	-	-	-	-	-	-	0.00	100.00	0.06	99.99
9	-	-	-	-	-	-	-	-	0.00	100.00	0.01	100.00
	<i>U.S.</i>				<i>GER</i>				<i>U.S. – GER</i>			
	Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	97.22	97.22	93.55	93.55	96.86	96.86	87.59	87.59	86.40	86.40	65.49	65.49
2	2.70	99.93	5.42	98.97	3.00	99.86	9.33	96.91	11.28	97.68	25.14	90.62
3	0.07	100.00	0.88	99.85	0.14	99.99	2.67	99.58	1.64	99.32	4.96	95.59
4	0.00	100.00	0.14	99.99	0.01	100.00	0.40	99.98	0.59	99.90	2.36	97.95
5	-	-	-	-	-	-	-	-	0.06	99.96	1.35	99.30
6	-	-	-	-	-	-	-	-	0.03	100.00	0.42	99.72
7	-	-	-	-	-	-	-	-	0.00	100.00	0.20	99.92
8	-	-	-	-	-	-	-	-	0.00	100.00	0.07	99.99
9	-	-	-	-	-	-	-	-	0.00	100.00	0.01	100.00
	<i>U.S.</i>				<i>Japan</i>				<i>U.S. – Japan</i>			
	Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	97.22	97.22	93.55	93.55	98.72	98.72	84.67	84.67	88.37	88.37	52.66	52.66
2	2.70	99.93	5.42	98.97	1.18	99.91	11.34	96.01	10.18	98.55	36.46	89.12
3	0.07	100.00	0.88	99.85	0.09	99.99	3.47	99.48	0.95	99.49	5.68	94.80
4	0.00	100.00	0.14	99.99	0.01	100.00	0.48	99.97	0.44	99.94	2.69	97.49
5	-	-	-	-	-	-	-	-	0.04	99.97	1.74	99.23
6	-	-	-	-	-	-	-	-	0.02	100.00	0.44	99.67
7	-	-	-	-	-	-	-	-	0.00	100.00	0.24	99.91
8	-	-	-	-	-	-	-	-	0.00	100.00	0.07	99.98
9	-	-	-	-	-	-	-	-	0.00	100.00	0.02	100.00

Table 3, continued.

	PCs								$PC^{(c)}_s$			
	GER				$U.K.$				$GER - U.K.$			
	Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	96.86	96.86	87.59	87.59	98.10	98.10	89.96	89.96	92.04	92.04	63.22	63.22
2	3.00	99.86	9.33	96.91	1.80	99.90	8.81	98.77	5.77	97.81	25.59	88.82
3	0.14	99.99	2.67	99.58	0.09	99.99	1.09	99.87	1.80	99.61	5.71	94.53
4	0.01	100.00	0.40	99.98	0.01	100.00	0.12	99.99	0.29	99.91	3.32	97.85
5	-	-	-	-	-	-	-	-	0.06	99.97	1.34	99.19
6	-	-	-	-	-	-	-	-	0.03	100.00	0.53	99.73
7	-	-	-	-	-	-	-	-	0.00	100.00	0.20	99.93
8	-	-	-	-	-	-	-	-	0.00	100.00	0.06	99.99
9	-	-	-	-	-	-	-	-	0.00	100.00	0.01	99.99

	GER				$Japan$				$GER - Japan$			
	Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	96.86	96.86	87.59	87.59	98.72	98.72	84.67	84.67	92.87	92.87	54.77	54.77
2	3.00	99.86	9.33	96.91	1.18	99.91	11.34	96.01	5.02	97.89	5.83	91.98
4	0.01	100.00	0.40	99.98	0.01	100.00	0.48	99.97	1.73	99.61	4.50	96.48
5	-	-	-	-	-	-	-	-	0.28	99.90	1.74	98.21
6	-	-	-	-	-	-	-	-	0.07	99.97	1.32	99.54
7	-	-	-	-	-	-	-	-	0.03	99.99	0.24	99.78
8	-	-	-	-	-	-	-	-	0.00	100.00	0.20	99.97
9	-	-	-	-	-	-	-	-	0.00	100.00	0.02	99.99

	$U.K.$				$Japan$				$U.K. - Japan$			
	Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	98.10	98.10	89.96	89.96	98.72	98.72	84.67	84.67	95.02	95.02	51.32	51.32
2	1.80	99.90	8.81	98.77	1.18	99.91	11.34	96.01	3.56	98.59	36.03	87.35
3	0.09	99.99	1.09	99.87	0.09	99.99	3.47	99.48	1.14	99.72	5.69	93.04
4	0.01	100.00	0.12	99.99	0.01	100.00	0.48	99.97	0.20	99.92	4.37	97.40
5	-	-	-	-	-	-	-	-	0.04	99.97	1.73	99.13
6	-	-	-	-	-	-	-	-	0.03	99.99	0.55	99.68
7	-	-	-	-	-	-	-	-	0.00	100.00	0.24	99.92
8	-	-	-	-	-	-	-	-	0.00	100.00	0.06	99.98
9	-	-	-	-	-	-	-	-	0.00	100.00	0.02	99.99

2nd and 3rd Steps : Regressing Yields on $PC^{(c)}$ s and Associated Correlations

		Yield levels										Yield differences									
Panel A		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
US	1y	0.81	0.15	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.21	0.06	0.15	0.00	0.02	0.00	0.00	0.00	0.00
	2y	0.87	0.12	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.25	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00
	3y	0.92	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.26	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00
	4y	0.94	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.27	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	5y	0.96	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6y	0.97	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.26	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.97	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.26	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.97	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.25	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.97	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.24	0.02	0.05	0.00	0.01	0.00	0.00	0.00	0.00
	R_a^2	0.93	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.25	0.02	0.04	0.00	0.01	0.00	0.00	0.00	0.00
UK	1y	0.90	0.02	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.31	0.23	0.02	0.04	0.00	0.00	0.00	0.00	0.00
	2y	0.95	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.33	0.11	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	3y	0.96	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.33	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	4y	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.32	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	5y	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.30	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	6y	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.28	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.25	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.93	0.06	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.22	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.92	0.07	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.20	0.13	0.01	0.01	0.00	0.00	0.00	0.00	0.00
	R_a^2	0.94	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.28	0.08	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Panel B		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
US	1y	0.90	0.39	0.17	-0.10	0.03	0.03	0.00	0.01	0.00	0.00	0.74	-0.46	-0.24	-0.39	0.06	0.16	0.04	0.00	0.00	0.00
	2y	0.93	0.34	0.08	-0.06	-0.01	0.00	0.00	-0.01	0.00	0.00	0.81	-0.50	-0.17	-0.23	-0.01	-0.04	-0.06	0.00	0.00	-0.01
	3y	0.96	0.28	0.02	-0.02	-0.02	-0.02	0.00	-0.01	0.00	0.00	0.84	-0.51	-0.10	-0.11	-0.04	-0.10	-0.03	0.00	0.00	0.01
	4y	0.97	0.23	-0.03	0.00	-0.02	-0.02	0.00	0.00	0.00	0.00	0.85	-0.52	-0.05	-0.02	-0.03	-0.10	0.01	0.00	0.00	0.01
	5y	0.98	0.19	-0.07	0.03	-0.01	-0.01	0.00	0.01	0.00	0.00	0.85	-0.52	0.00	0.06	-0.02	-0.07	0.04	0.00	0.00	0.00
	6y	0.98	0.15	-0.10	0.04	0.00	-0.01	0.00	0.01	0.00	0.00	0.85	-0.51	0.04	0.11	-0.01	-0.03	0.04	0.00	0.00	-0.01
	7y	0.98	0.11	-0.12	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.84	-0.51	0.08	0.16	0.01	0.02	0.02	0.00	0.00	-0.01
	8y	0.98	0.08	-0.14	0.06	0.02	0.01	0.00	0.00	0.00	0.00	0.83	-0.50	0.11	0.20	0.02	0.07	-0.01	0.00	0.00	0.00
	9y	0.98	0.06	-0.16	0.07	0.02	0.02	0.00	-0.01	0.00	0.00	0.82	-0.49	0.14	0.23	0.04	0.11	-0.05	0.00	0.00	0.01
	R_a^2	0.95	-0.13	0.27	0.10	0.05	-0.02	-0.01	0.00	0.00	0.00	0.62	0.56	-0.48	0.15	0.21	-0.05	0.00	-0.03	0.00	0.00
UK	1y	0.97	-0.14	0.17	0.06	-0.01	0.00	0.01	0.00	0.00	0.00	0.74	0.57	-0.34	0.11	-0.03	0.01	0.00	0.06	-0.02	0.00
	2y	0.98	-0.17	0.10	0.03	-0.03	0.01	0.01	0.00	0.00	0.00	0.78	0.57	-0.20	0.06	-0.11	0.03	0.00	0.03	0.01	0.00
	3y	0.98	-0.19	0.05	0.00	-0.03	0.01	0.00	0.00	0.00	0.00	0.81	0.57	-0.07	0.02	-0.11	0.03	0.00	-0.01	0.01	0.00
	4y	0.98	-0.21	0.01	-0.02	-0.02	0.01	-0.01	0.00	0.00	0.00	0.83	0.55	0.05	-0.02	-0.08	0.02	0.00	-0.04	0.00	0.00
	5y	0.97	-0.22	-0.02	-0.04	-0.01	0.01	-0.01	0.00	0.00	0.00	0.83	0.53	0.15	-0.05	-0.03	0.01	0.00	-0.04	-0.01	0.00
	6y	0.97	-0.24	-0.05	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.50	0.24	-0.08	0.02	-0.01	0.00	-0.02	-0.01	0.00
	7y	0.96	-0.25	-0.07	-0.07	0.02	-0.01	0.00	0.00	0.00	0.00	0.82	0.47	0.31	-0.09	0.07	-0.02	0.00	0.01	0.00	0.00
	8y	0.96	-0.26	-0.09	-0.08	0.03	-0.02	0.01	0.00	0.00	0.00	0.80	0.45	0.36	-0.11	0.11	-0.04	0.00	0.05	0.01	0.00
	9y	0.96	-0.26	-0.09	-0.08	0.03	-0.02	0.01	0.00	0.00	0.00	0.80	0.45	0.36	-0.11	0.11	-0.04	0.00	0.05	0.01	0.00
	R_a^2	0.94	-0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.28	0.08	0.01	0.01	0.00	0.00	0.00	0.00	0.00

Table 4: In Panel A we report the R^2 obtained from the regression of each time series of U.S. and U.K. yields on the associated common principal components ($PC^{(c)}$ s). In Panel B we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

		Yield levels										Yield differences									
Panel A		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>US</i>	1y	0.72	0.21	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.20	0.05	0.16	0.00	0.03	0.00	0.00	0.00	0.00
	2y	0.79	0.18	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.23	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00
	3y	0.84	0.15	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.24	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00
	4y	0.88	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	5y	0.90	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.24	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	6y	0.91	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.24	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.92	0.07	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.24	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.92	0.06	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.23	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.92	0.05	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.22	0.02	0.06	0.00	0.01	0.00	0.00	0.00	0.00
	R_a^2	0.87	0.11	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.23	0.01	0.04	0.00	0.01	0.00	0.00	0.00	0.00
<i>GER</i>	1y	0.72	0.21	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.25	0.27	0.01	0.11	0.00	0.00	0.00	0.00	0.00
	2y	0.79	0.17	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.29	0.13	0.01	0.00	0.00	0.01	0.00	0.00	0.00
	3y	0.85	0.14	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.30	0.05	0.01	0.02	0.00	0.00	0.00	0.00	0.00
	4y	0.88	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.30	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00
	5y	0.90	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.29	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
	6y	0.91	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.28	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.91	0.07	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.26	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.90	0.07	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.24	0.10	0.01	0.01	0.00	0.00	0.00	0.00	0.00
	9y	0.89	0.06	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.22	0.14	0.02	0.04	0.00	0.01	0.00	0.00	0.00
	R_a^2	0.86	0.11	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.27	0.09	0.01	0.03	0.00	0.00	0.00	0.00	0.00
Panel B		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>US</i>	1y	0.85	0.46	-0.22	-0.14	0.01	0.04	0.00	0.01	0.00	0.00	0.75	-0.45	-0.22	-0.40	0.02	0.16	0.01	0.04	0.00	0.00
	2y	0.89	0.43	-0.14	-0.09	0.00	-0.01	0.01	-0.01	0.00	0.00	0.82	-0.48	-0.15	-0.24	-0.03	-0.04	0.00	-0.06	0.00	0.00
	3y	0.92	0.39	-0.07	-0.04	0.00	-0.03	0.00	-0.01	0.00	0.00	0.85	-0.49	-0.09	-0.12	-0.03	-0.10	-0.01	-0.03	0.00	0.00
	4y	0.94	0.35	-0.02	0.00	0.00	-0.03	0.00	0.00	0.00	0.00	0.86	-0.49	-0.04	-0.02	-0.02	-0.10	-0.01	0.01	0.00	0.00
	5y	0.95	0.32	0.02	0.04	0.00	-0.02	0.00	0.00	0.00	0.00	0.86	-0.49	0.01	0.05	-0.01	-0.07	0.00	0.04	0.00	0.00
	6y	0.95	0.29	0.06	0.06	0.00	-0.01	0.00	0.01	0.00	0.00	0.86	-0.49	0.05	0.11	0.00	-0.03	0.00	0.04	0.00	0.00
	7y	0.96	0.26	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.85	-0.49	0.08	0.16	0.02	0.02	0.00	0.02	0.00	0.00
	8y	0.96	0.24	0.11	0.10	0.00	0.02	0.00	0.00	0.00	0.00	0.84	-0.48	0.11	0.20	0.03	0.07	0.00	-0.01	0.00	0.00
	9y	0.96	0.22	0.13	0.12	0.00	0.03	0.01	-0.01	0.00	0.00	0.83	-0.47	0.14	0.24	0.04	0.12	0.01	-0.05	0.00	0.00
	R_a^2	0.85	-0.45	-0.23	0.10	0.06	0.00	-0.01	0.00	0.00	0.00	0.60	0.50	-0.52	0.10	0.33	-0.01	-0.07	0.00	0.01	0.00
<i>GER</i>	1y	0.85	-0.45	-0.23	0.10	0.06	0.00	-0.01	0.00	0.00	0.00	0.74	0.54	-0.37	0.10	-0.03	-0.01	0.10	0.00	-0.02	0.00
	2y	0.89	-0.41	-0.18	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.79	0.55	-0.21	0.07	-0.16	0.01	0.05	0.00	0.01	0.00
	3y	0.92	-0.37	-0.11	0.03	-0.03	0.00	0.01	0.00	0.00	0.00	0.81	0.55	-0.08	0.04	-0.18	0.02	-0.02	0.00	0.02	0.00
	4y	0.94	-0.34	-0.05	-0.01	-0.04	0.00	0.00	0.00	0.00	0.00	0.83	0.54	0.05	0.00	-0.14	0.02	-0.06	0.00	0.00	0.00
	5y	0.95	-0.31	0.02	-0.03	-0.03	0.01	-0.01	0.00	0.00	0.00	0.83	0.53	0.15	-0.03	-0.07	0.01	-0.07	0.00	-0.01	0.00
	6y	0.95	-0.29	0.07	-0.06	-0.02	0.00	-0.01	0.00	0.00	0.00	0.82	0.51	0.24	-0.07	0.02	0.00	-0.04	0.00	-0.02	0.00
	7y	0.95	-0.27	0.12	-0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.49	0.32	-0.10	0.11	-0.01	0.01	0.00	-0.01	0.00
	8y	0.95	-0.26	0.16	-0.09	0.02	0.00	0.00	0.00	0.00	0.00	0.77	0.46	0.37	-0.13	0.20	-0.03	0.08	0.00	0.02	0.00
	9y	0.95	-0.24	0.19	-0.10	0.05	-0.01	0.01	0.00	0.00	0.00										
	R_a^2	0.95	-0.24	0.19	-0.10	0.05	-0.01	0.01	0.00	0.00	0.00										

Table 5: In Panel A we report the R^2 obtained from the regression of each time series of U.S. and German yields on the associated common principal components ($PC^{(c)}s$). In Panel B we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

Panel A	Yield levels										Yield differences									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>US</i>	1y	0.72	0.23	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.22	0.00	0.20	0.00	0.03	0.00	0.00	0.00	0.00
	2y	0.79	0.19	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.27	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00
	3y	0.84	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.29	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00
	4y	0.88	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.29	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	5y	0.91	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.28	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	6y	0.92	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.28	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.93	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.27	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.94	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.25	0.00	0.05	0.00	0.01	0.00	0.00	0.00	0.00
	9y	0.94	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.24	0.00	0.08	0.00	0.01	0.00	0.00	0.00	0.00
	R_a^2	0.87	0.11	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.26	0.00	0.05	0.00	0.01	0.00	0.00	0.00	0.00
<i>JAP</i>	1y	0.84	0.12	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.25	0.34	0.26	0.00	0.14	0.00	0.01	0.00	0.00	0.00
	2y	0.86	0.12	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.33	0.44	0.22	0.00	0.00	0.00	0.01	0.00	0.00	0.00
	3y	0.88	0.11	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.50	0.09	0.00	0.03	0.00	0.00	0.00	0.00	0.00
	4y	0.90	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.52	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00
	5y	0.90	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.53	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
	6y	0.91	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.51	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00
	7y	0.91	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.43	0.49	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.91	0.08	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.40	0.45	0.14	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	9y	0.91	0.07	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.35	0.40	0.19	0.00	0.06	0.00	0.01	0.00	0.00	0.00
	R_a^2	0.89	0.10	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.38	0.46	0.11	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Panel B																				
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>US</i>	1y	0.85	-0.48	-0.23	0.06	0.03	-0.03	0.00	-0.01	0.00	0.74	-0.47	-0.05	-0.45	0.00	0.17	0.01	0.04	0.00	0.00
	2y	0.89	-0.44	-0.13	0.04	0.00	0.01	0.00	0.01	0.00	0.80	-0.52	-0.04	-0.28	-0.01	-0.04	0.00	-0.06	0.00	0.00
	3y	0.92	-0.39	-0.05	0.02	-0.01	0.02	0.00	0.00	0.00	0.83	-0.53	-0.02	-0.14	-0.01	-0.11	0.00	-0.03	0.00	0.00
	4y	0.94	-0.34	0.00	0.00	-0.02	0.02	0.00	0.00	0.00	0.84	-0.54	-0.01	-0.04	-0.01	-0.11	0.00	0.01	0.00	0.00
	5y	0.95	-0.30	0.05	-0.02	-0.01	0.02	0.00	-0.01	0.00	0.84	-0.53	0.00	0.05	-0.01	-0.07	0.00	0.04	0.00	0.00
	6y	0.96	-0.26	0.08	-0.03	-0.01	0.01	0.00	-0.01	0.00	0.84	-0.52	0.01	0.12	0.00	-0.03	0.00	0.04	0.00	0.00
	7y	0.97	-0.23	0.11	-0.04	0.00	0.00	0.00	0.00	0.00	0.84	-0.52	0.01	0.18	0.00	0.02	0.00	0.02	0.00	0.00
	8y	0.97	-0.20	0.13	-0.05	0.01	-0.02	0.00	0.00	0.00	0.83	-0.50	0.02	0.23	0.01	0.07	0.00	-0.01	0.00	0.00
	9y	0.97	-0.18	0.15	-0.06	0.02	-0.03	0.00	0.01	0.00	0.82	-0.49	0.02	0.28	0.02	0.12	0.00	-0.05	0.00	0.00
	R_a^2	0.92	0.35	-0.11	-0.14	0.03	0.02	-0.01	0.00	0.00	0.50	0.58	-0.51	0.01	0.37	0.00	-0.09	0.00	0.01	0.00
<i>JAP</i>	1y	0.92	0.35	-0.11	-0.14	0.03	0.02	-0.01	0.00	0.00	0.50	0.58	-0.51	0.01	0.37	0.00	-0.09	0.00	0.01	0.00
	2y	0.93	0.34	-0.10	-0.10	0.00	0.00	0.01	0.00	0.00	0.57	0.67	-0.46	0.02	0.00	0.00	0.10	0.00	-0.03	0.00
	3y	0.94	0.33	-0.07	-0.05	-0.02	-0.01	0.01	0.00	0.00	0.62	0.71	-0.29	0.02	-0.16	0.00	0.06	0.00	0.01	0.00
	4y	0.95	0.32	-0.04	0.00	-0.03	-0.01	0.00	0.00	0.00	0.65	0.72	-0.12	0.01	-0.20	0.00	-0.01	0.00	0.02	0.00
	5y	0.95	0.31	-0.02	0.04	-0.02	-0.01	0.00	0.00	0.00	0.66	0.73	0.04	0.00	-0.17	0.01	-0.06	0.00	0.01	0.00
	6y	0.95	0.29	0.01	0.07	-0.02	-0.01	-0.01	0.00	0.00	0.66	0.72	0.17	-0.01	-0.10	0.00	-0.07	0.00	-0.01	0.00
	7y	0.95	0.28	0.03	0.08	0.00	0.00	-0.01	0.00	0.00	0.65	0.70	0.28	-0.02	0.00	0.00	-0.04	0.00	-0.02	0.00
	8y	0.96	0.27	0.06	0.09	0.02	0.01	0.00	0.00	0.00	0.63	0.67	0.37	-0.02	0.12	0.00	0.01	0.00	-0.01	0.00
	9y	0.96	0.26	0.08	0.09	0.04	0.02	0.01	0.00	0.00	0.59	0.63	0.43	-0.03	0.24	-0.01	0.10	0.00	0.02	0.00
	R_a^2	0.96	0.26	0.08	0.09	0.04	0.02	0.01	0.00	0.00	0.59	0.63	0.43	-0.03	0.24	-0.01	0.10	0.00	0.02	0.00

Table 6: In Panel A we report the R^2 obtained from the regression of each time series of U.S. and Japanese yields on the associated common principal components ($PC^{(c)}s$). In Panel B we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

Panel A		Yield levels										Yield differences									
		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>GER</i>	1y	0.80	0.14	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.18	0.22	0.08	0.10	0.00	0.00	0.00	0.00	0.00
	2y	0.86	0.11	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.24	0.11	0.05	0.00	0.00	0.01	0.00	0.00	0.00
	3y	0.90	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.27	0.04	0.02	0.03	0.00	0.00	0.00	0.00	0.00
	4y	0.94	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.28	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00
	5y	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.29	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
	6y	0.95	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.29	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.95	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.29	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.94	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.27	0.07	0.04	0.01	0.00	0.00	0.00	0.00	0.00
	9y	0.93	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.25	0.09	0.05	0.04	0.00	0.01	0.00	0.00	0.00
	R_a^2	0.91	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.26	0.06	0.03	0.03	0.00	0.00	0.00	0.00	0.00
<i>UK</i>	1y	0.85	0.08	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.24	0.15	0.11	0.00	0.04	0.00	0.00	0.00	0.00
	2y	0.90	0.07	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.27	0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00
	3y	0.93	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.27	0.03	0.02	0.00	0.01	0.00	0.00	0.00	0.00
	4y	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.27	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	5y	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.26	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	6y	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.25	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.95	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.24	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.94	0.05	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.22	0.06	0.04	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.93	0.05	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.21	0.08	0.06	0.00	0.01	0.00	0.00	0.00	0.00
	R_a^2	0.93	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.25	0.05	0.04	0.00	0.01	0.00	0.00	0.00	0.00
Panel B		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>GER</i>	1y	0.89	0.38	0.22	-0.10	0.05	0.02	0.01	0.00	0.00	0.00	0.65	-0.42	-0.47	-0.28	0.32	0.02	-0.07	0.00	0.01	0.00
	2y	0.93	0.34	0.16	-0.04	-0.01	0.00	-0.01	0.00	0.00	0.00	0.77	-0.49	-0.32	-0.22	-0.04	0.00	0.10	0.00	-0.02	0.00
	3y	0.95	0.29	0.10	-0.01	-0.03	-0.01	-0.01	0.00	0.00	0.00	0.80	-0.52	-0.19	-0.13	-0.16	-0.01	0.05	0.00	0.01	0.00
	4y	0.97	0.25	0.03	0.02	-0.03	-0.02	0.00	0.00	0.00	0.00	0.82	-0.53	-0.08	-0.05	-0.18	-0.01	-0.02	0.00	0.02	0.00
	5y	0.98	0.21	-0.03	0.03	-0.03	-0.02	0.01	0.00	0.00	0.00	0.83	-0.54	0.03	0.02	-0.14	-0.01	-0.06	0.00	0.00	0.00
	6y	0.98	0.19	-0.09	0.04	-0.01	-0.01	0.01	0.00	0.00	0.00	0.82	-0.54	0.12	0.09	-0.07	-0.01	-0.07	0.00	-0.01	0.00
	7y	0.98	0.17	-0.14	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.81	-0.53	0.19	0.15	0.02	0.00	-0.04	0.00	-0.01	0.00
	8y	0.97	0.15	-0.18	0.05	0.03	0.01	0.00	0.00	0.00	0.00	0.78	-0.52	0.26	0.19	0.11	0.01	0.01	0.00	-0.01	0.00
	9y	0.96	0.14	-0.22	0.05	0.04	0.02	-0.01	0.00	0.00	0.00	0.75	-0.50	0.30	0.23	0.20	0.02	0.08	0.00	0.02	0.00
	R_a^2	0.92	-0.27	0.26	0.08	0.04	-0.04	0.00	-0.01	0.00	0.00	0.67	0.49	-0.39	0.34	0.03	-0.21	0.00	0.03	0.00	0.00
<i>UK</i>	1y	0.92	-0.27	0.26	0.08	0.04	-0.04	0.00	-0.01	0.00	0.00	0.67	0.49	-0.39	0.34	0.03	-0.21	0.00	0.03	0.00	0.00
	2y	0.95	-0.26	0.16	0.07	0.00	0.01	0.00	0.01	0.00	0.00	0.77	0.52	-0.27	0.24	-0.01	0.03	0.01	-0.06	0.00	0.02
	3y	0.97	-0.24	0.09	0.04	-0.02	0.02	0.00	0.00	0.00	0.00	0.82	0.52	-0.16	0.14	-0.03	0.11	0.00	-0.03	0.00	-0.01
	4y	0.97	-0.23	0.03	0.01	-0.02	0.02	0.00	0.00	0.00	0.00	0.84	0.52	-0.06	0.05	-0.02	0.12	0.00	0.01	0.00	-0.01
	5y	0.98	-0.22	-0.01	-0.02	-0.02	0.02	0.00	-0.01	0.00	0.00	0.85	0.51	0.04	-0.03	-0.01	0.08	-0.01	0.04	0.00	0.00
	6y	0.97	-0.21	-0.04	-0.04	-0.01	0.01	0.00	-0.01	0.00	0.00	0.85	0.50	0.12	-0.10	0.00	0.03	0.00	0.04	0.00	0.01
	7y	0.97	-0.21	-0.07	-0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.49	0.19	-0.16	0.01	-0.02	0.00	0.02	0.00	0.01
	8y	0.97	-0.21	-0.10	-0.08	0.00	-0.02	0.00	0.00	0.00	0.00	0.82	0.47	0.25	-0.21	0.02	-0.07	0.00	-0.01	0.00	0.00
	9y	0.96	-0.22	-0.12	-0.09	0.01	-0.03	0.00	0.01	0.00	0.00	0.80	0.46	0.29	-0.24	0.03	-0.11	0.01	-0.05	0.00	-0.01
	R_a^2	0.92	-0.27	0.26	0.08	0.04	-0.04	0.00	-0.01	0.00	0.00	0.67	0.49	-0.39	0.34	0.03	-0.21	0.00	0.03	0.00	0.00

Table 7: In Panel A we report the R^2 obtained from the regression of each time series of German and U.K. yields on the associated common principal components ($PC^{(c)}s$). In Panel B we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

		Yield levels										Yield differences									
Panel A		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>GER</i>	1y	0.84	0.07	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.18	0.04	0.26	0.00	0.10	0.00	0.00	0.00	0.00
	2y	0.89	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.28	0.03	0.12	0.00	0.00	0.00	0.01	0.00	0.00
	3y	0.93	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.31	0.01	0.04	0.00	0.03	0.00	0.00	0.00	0.00
	4y	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.33	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00
	5y	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.34	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00
	6y	0.95	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.33	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.94	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.32	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.92	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.29	0.02	0.09	0.00	0.01	0.00	0.00	0.00	0.00
	9y	0.91	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.26	0.02	0.12	0.00	0.04	0.00	0.01	0.00	0.00
	R_a^2	0.92	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.29	0.01	0.08	0.00	0.03	0.00	0.00	0.00	0.00
<i>JAP</i>	1y	0.89	0.08	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.27	0.23	0.03	0.14	0.00	0.01	0.00	0.00	0.00
	2y	0.91	0.07	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.32	0.19	0.02	0.00	0.00	0.01	0.00	0.00	0.00
	3y	0.93	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.36	0.08	0.01	0.03	0.00	0.00	0.00	0.00	0.00
	4y	0.95	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.37	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00
	5y	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.38	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
	6y	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.37	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	7y	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.35	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.95	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.32	0.13	0.01	0.01	0.00	0.00	0.00	0.00	0.00
	9y	0.94	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.28	0.17	0.02	0.06	0.00	0.01	0.00	0.00	0.00
	R_a^2	0.94	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.33	0.10	0.01	0.03	0.00	0.00	0.00	0.00	0.00
Panel B		1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>GER</i>	1y	0.92	0.26	0.28	-0.07	0.05	0.02	0.00	-0.01	0.00	0.00	0.65	-0.43	-0.20	-0.51	-0.01	-0.32	0.01	0.07	0.00	-0.01
	2y	0.94	0.26	0.21	-0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.75	-0.53	-0.16	-0.35	0.01	0.04	-0.02	-0.10	0.00	0.02
	3y	0.96	0.24	0.13	0.00	-0.03	-0.01	0.00	0.01	0.00	0.00	0.78	-0.56	-0.11	-0.20	0.01	0.16	-0.01	-0.05	0.00	-0.01
	4y	0.97	0.23	0.04	0.02	-0.04	-0.01	0.00	0.00	0.00	0.00	0.79	-0.58	-0.05	-0.07	0.01	0.18	0.00	0.02	0.00	-0.02
	5y	0.97	0.22	-0.03	0.03	-0.03	-0.01	0.00	-0.01	0.00	0.00	0.80	-0.58	0.00	0.04	0.01	0.14	0.01	0.06	0.00	0.00
	6y	0.97	0.21	-0.09	0.03	-0.02	0.00	0.00	-0.01	0.00	0.00	0.80	-0.58	0.05	0.14	0.01	0.06	0.01	0.07	0.00	0.01
	7y	0.97	0.20	-0.14	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.79	-0.56	0.09	0.23	0.00	-0.02	0.01	0.04	0.00	0.01
	8y	0.96	0.20	-0.19	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.77	-0.54	0.13	0.30	-0.01	-0.12	0.00	-0.01	0.00	0.01
	9y	0.95	0.20	-0.22	0.02	0.04	0.02	0.00	0.01	0.00	0.00	0.74	-0.51	0.16	0.35	-0.02	-0.20	-0.02	-0.08	0.00	-0.02
	R_a^2	0.94	-0.29	0.13	0.11	0.04	-0.02	-0.01	0.00	0.00	0.00	0.57	0.52	-0.48	0.17	0.37	-0.02	-0.09	0.01	0.01	0.00
<i>JAP</i>	1y	0.94	-0.29	0.13	0.11	0.04	-0.02	-0.01	0.00	0.00	0.00	0.67	0.57	-0.44	0.15	0.00	-0.01	0.10	-0.01	-0.03	0.00
	2y	0.95	-0.27	0.10	0.08	0.01	0.00	0.01	0.00	0.00	0.00	0.73	0.60	-0.28	0.09	-0.16	0.00	0.06	-0.01	0.01	0.00
	3y	0.97	-0.24	0.06	0.04	-0.01	0.02	0.01	0.00	0.00	0.00	0.76	0.61	-0.11	0.03	-0.20	0.01	-0.01	0.00	0.02	0.00
	4y	0.97	-0.22	0.03	0.01	-0.02	0.02	0.00	0.00	0.00	0.00	0.77	0.61	0.04	-0.02	-0.17	0.01	-0.06	0.01	0.01	0.00
	5y	0.98	-0.20	-0.01	-0.02	-0.02	0.02	0.00	0.00	0.00	0.00	0.77	0.61	0.17	-0.06	-0.10	0.01	-0.07	0.01	-0.01	0.00
	6y	0.98	-0.19	-0.04	-0.05	-0.02	0.02	-0.01	0.00	0.00	0.00	0.75	0.59	0.27	-0.09	0.00	0.01	-0.04	0.01	-0.02	0.00
	7y	0.98	-0.19	-0.06	-0.07	-0.01	0.00	-0.01	0.00	0.00	0.00	0.73	0.56	0.36	-0.11	0.12	0.00	0.01	0.00	-0.01	0.00
	8y	0.98	-0.19	-0.08	-0.08	0.01	-0.02	0.00	0.00	0.00	0.00	0.69	0.53	0.41	-0.13	0.24	-0.01	0.10	-0.02	0.02	0.00
	9y	0.97	-0.19	-0.10	-0.08	0.02	-0.04	0.01	0.00	0.00	0.00										
	R_a^2	0.94	-0.29	0.13	0.11	0.04	-0.02	-0.01	0.00	0.00	0.00	0.57	0.52	-0.48	0.17	0.37	-0.02	-0.09	0.01	0.01	0.00

Table 8: In Panel A we report the R^2 obtained from the regression of each time series of German and Japanese yields on the associated common principal components ($PC^{(c)}_s$). In Panel B we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

Panel A	Yield levels										Yield differences									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>UK</i>	1y	0.87	0.08	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.25	0.01	0.27	0.00	0.04	0.00	0.00	0.00	0.00
	2y	0.92	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.31	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00
	3y	0.94	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.33	0.00	0.05	0.00	0.01	0.00	0.00	0.00	0.00
	4y	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.33	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
	5y	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.32	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	6y	0.97	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.31	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.97	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.29	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.97	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.28	0.00	0.10	0.00	0.01	0.00	0.00	0.00	0.00
	9y	0.96	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.26	0.00	0.14	0.00	0.01	0.00	0.00	0.00	0.00
	R_a^2	0.95	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.30	0.00	0.09	0.00	0.01	0.00	0.00	0.00	0.00
<i>JAP</i>	1y	0.92	0.04	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.31	0.28	0.26	0.00	0.14	0.00	0.01	0.00	0.00	0.00
	2y	0.94	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.39	0.22	0.00	0.00	0.00	0.01	0.00	0.00	0.00
	3y	0.95	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.46	0.09	0.00	0.02	0.00	0.00	0.00	0.00	0.00
	4y	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.49	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00
	5y	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.50	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
	6y	0.96	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.48	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00
	7y	0.96	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.45	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.96	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.41	0.14	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	9y	0.96	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.35	0.18	0.00	0.06	0.00	0.01	0.00	0.00	0.00
	R_a^2	0.95	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.42	0.11	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Panel B																				
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
<i>UK</i>	1y	0.93	0.27	0.23	-0.05	0.04	0.03	0.00	-0.01	0.00	0.65	-0.50	-0.08	0.52	0.01	0.21	0.00	-0.03	0.00	0.00
	2y	0.96	0.26	0.12	-0.04	0.00	0.00	0.00	0.01	0.00	0.74	-0.56	-0.06	0.36	-0.02	-0.03	0.00	0.06	0.00	-0.02
	3y	0.97	0.23	0.04	-0.03	-0.02	-0.02	0.00	0.01	0.00	0.78	-0.57	-0.04	0.22	-0.02	-0.11	0.00	0.03	0.00	0.01
	4y	0.98	0.20	-0.01	-0.01	-0.02	-0.02	0.00	0.00	0.00	0.81	-0.57	-0.02	0.08	-0.01	-0.12	0.00	-0.01	0.00	0.01
	5y	0.98	0.18	-0.05	0.01	-0.02	-0.01	0.00	-0.01	0.00	0.82	-0.57	0.00	-0.04	0.00	-0.08	0.00	-0.04	0.00	0.00
	6y	0.98	0.15	-0.08	0.03	-0.01	-0.01	0.00	-0.01	0.00	0.81	-0.56	0.02	-0.15	0.00	-0.03	0.00	-0.04	0.00	-0.01
	7y	0.98	0.14	-0.10	0.04	0.00	0.00	0.00	0.00	0.00	0.80	-0.54	0.03	-0.24	0.00	0.02	0.00	-0.02	0.00	-0.01
	8y	0.98	0.12	-0.12	0.05	0.01	0.01	0.00	0.00	0.00	0.79	-0.53	0.05	-0.31	0.01	0.07	0.00	0.01	0.00	0.00
	9y	0.98	0.10	-0.14	0.07	0.02	0.03	0.00	0.01	0.00	0.76	-0.51	0.06	-0.37	0.01	0.11	0.01	0.05	0.00	0.01
	R_a^2	0.96	-0.20	0.18	0.09	0.02	-0.02	-0.01	0.00	0.00	0.56	0.53	-0.51	-0.04	0.37	0.00	-0.09	0.00	0.01	0.00
<i>JAP</i>	1y	0.96	-0.20	0.18	0.09	0.02	-0.02	-0.01	0.00	0.00	0.62	0.62	-0.46	-0.05	0.00	0.00	0.10	0.00	-0.03	0.00
	2y	0.97	-0.20	0.14	0.06	-0.01	0.00	0.01	0.00	0.00	0.65	0.68	-0.29	-0.03	-0.16	0.00	0.06	0.00	0.01	0.00
	3y	0.98	-0.20	0.09	0.02	-0.02	0.01	0.01	0.00	0.00	0.68	0.70	-0.12	-0.01	-0.20	0.01	-0.01	0.00	0.02	0.00
	4y	0.98	-0.19	0.04	-0.01	-0.02	0.02	0.00	0.00	0.00	0.69	0.70	0.04	0.01	-0.17	0.01	-0.06	0.00	0.01	0.00
	5y	0.98	-0.19	0.00	-0.03	-0.02	0.02	0.00	0.00	0.00	0.69	0.69	0.17	0.02	-0.10	0.00	-0.07	0.00	-0.01	0.00
	6y	0.98	-0.18	-0.04	-0.05	-0.01	0.01	-0.01	0.00	0.00	0.68	0.67	0.28	0.04	0.00	0.00	-0.04	0.00	-0.02	0.00
	7y	0.98	-0.17	-0.07	-0.05	0.00	0.00	-0.01	0.00	0.00	0.66	0.64	0.37	0.05	0.12	0.00	0.01	0.00	-0.01	0.00
	8y	0.98	-0.16	-0.09	-0.05	0.02	-0.01	0.00	0.00	0.00	0.63	0.59	0.43	0.06	0.24	-0.01	0.10	0.00	0.02	0.00
	9y	0.98	-0.15	-0.11	-0.04	0.04	-0.03	0.01	0.00	0.00										
	R_a^2	0.98	-0.15	-0.11	-0.04	0.04	-0.03	0.01	0.00	0.00										

Table 9: In Panel A we report the R^2 obtained from the regression of each time series of U.K. and Japanese yields on the associated common principal components ($PC^{(c)}s$). In Panel B we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

The 3-country case. 1st step : Principal Component Analysis of international bond markets

Table 10: We report principal component analysis of the term structure of interest rates of three countries taken separately and jointly. The first column lists the number of principal components (four for a single country, and nine for any 3-country case), while the rest of the table is divided into four vertical blocks. Each of the first, second and third blocks represents an individual country, while the fourth block represents the three countries jointly. The first and second columns (third and fourth, respectively) of each block report marginal and cumulative percent variance explained for yield levels (yield differences, respectively). For each country we use weekly yields observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

	<i>PCs</i>												<i>PC^(c)_s</i>			
	<i>U.S.</i>				<i>U.K.</i>				<i>GER</i>				<i>U.S. – U.K. – GER</i>			
	Levels		Differences		Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	97.22	97.22	93.55	93.55	98.10	98.10	89.96	89.96	96.86	96.86	87.59	87.59	88.45	88.45	56.04	56.04
2	2.70	99.93	5.42	98.97	1.80	99.90	8.81	98.77	3.00	99.86	9.33	96.91	7.60	96.05	17.89	73.93
3	0.07	100.00	0.88	99.85	0.09	99.99	1.09	99.87	0.14	99.99	2.67	99.58	1.98	98.03	16.60	90.52
4	0.00	100.00	0.14	99.99	0.01	100.00	0.12	99.99	0.01	100.00	0.40	99.98	1.38	99.41	4.00	94.52
5	-	-	-	-	-	-	-	-	-	-	-	-	0.38	99.78	2.21	96.73
6	-	-	-	-	-	-	-	-	-	-	-	-	0.14	99.92	1.50	98.23
7	-	-	-	-	-	-	-	-	-	-	-	-	0.04	99.96	0.90	99.14
8	-	-	-	-	-	-	-	-	-	-	-	-	0.02	99.98	0.36	99.50
9	-	-	-	-	-	-	-	-	-	-	-	-	0.01	100.00	0.27	99.77
	<i>U.S.</i>				<i>U.K.</i>				<i>JAP</i>				<i>U.S. – U.K. – JAP</i>			
	Levels		Differences		Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	97.22	97.22	93.55	93.55	98.10	98.10	89.96	89.96	98.72	98.72	84.67	84.67	90.43	90.43	46.34	46.34
2	2.70	99.93	5.42	98.97	1.80	99.90	8.81	98.77	1.18	99.91	11.34	96.01	6.88	97.30	25.34	71.68
3	0.07	100.00	0.88	99.85	0.09	99.99	1.09	99.87	0.09	99.99	3.47	99.48	1.23	98.53	17.84	89.52
4	0.00	100.00	0.14	99.99	0.01	100.00	0.12	99.99	0.01	100.00	0.48	99.97	0.96	99.50	3.80	93.33
5	-	-	-	-	-	-	-	-	-	-	-	-	0.34	99.84	3.05	96.38
6	-	-	-	-	-	-	-	-	-	-	-	-	0.10	99.94	1.55	97.93
7	-	-	-	-	-	-	-	-	-	-	-	-	0.03	99.97	1.15	99.09
8	-	-	-	-	-	-	-	-	-	-	-	-	0.01	99.98	0.37	99.46
9	-	-	-	-	-	-	-	-	-	-	-	-	0.01	100.00	0.28	99.74

	PC_s												$PC^{(c)}_s$			
	$U.S.$				GER				JAP				$U.S. - GER - JAP$			
	Levels		Differences		Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	97.22	97.22	93.55	93.55	96.86	96.86	87.59	87.59	98.72	98.72	84.67	84.67	86.47	86.47	47.91	47.91
2	2.70	99.93	5.42	98.97	3.00	99.86	9.33	96.91	1.18	99.91	11.34	96.01	8.40	94.87	24.52	72.43
3	0.07	100.00	0.88	99.85	0.14	99.99	2.67	99.58	0.09	99.99	3.47	99.48	3.33	98.20	16.23	88.66
4	0.00	100.00	0.14	99.99	0.01	100.00	0.40	99.98	0.01	100.00	0.48	99.97	1.19	99.39	3.93	92.60
5	-	-	-	-	-	-	-	-	-	-	-	-	0.35	99.74	3.15	95.75
6	-	-	-	-	-	-	-	-	-	-	-	-	0.18	99.93	1.58	97.32
7	-	-	-	-	-	-	-	-	-	-	-	-	0.04	99.97	1.16	98.48
8	-	-	-	-	-	-	-	-	-	-	-	-	0.02	99.98	0.89	99.36
9	-	-	-	-	-	-	-	-	-	-	-	-	0.01	100.00	0.28	99.64
	PC_s												$PC^{(c)}_s$			
	$U.K.$				GER				JAP				$U.K. - GER - JAP$			
	Levels		Differences		Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	98.10	98.10	89.96	89.96	96.86	96.86	87.59	87.59	98.72	98.72	84.67	84.67	91.79	91.79	46.62	46.62
2	1.80	99.90	8.81	98.77	3.00	99.86	9.33	96.91	1.18	99.91	11.34	96.01	4.03	95.83	24.29	70.91
3	0.09	99.99	1.09	99.87	0.14	99.99	2.67	99.58	0.09	99.99	3.47	99.48	2.45	98.28	16.55	87.47
4	0.01	100.00	0.12	99.99	0.01	100.00	0.40	99.98	0.01	100.00	0.48	99.97	1.38	99.66	4.08	91.55
5	-	-	-	-	-	-	-	-	-	-	-	-	0.17	99.83	3.51	95.06
6	-	-	-	-	-	-	-	-	-	-	-	-	0.10	99.93	2.20	97.26
7	-	-	-	-	-	-	-	-	-	-	-	-	0.04	99.97	1.15	98.41
8	-	-	-	-	-	-	-	-	-	-	-	-	0.02	99.99	0.89	99.29
9	-	-	-	-	-	-	-	-	-	-	-	-	0.01	100.00	0.36	99.65

2nd and 3rd step : Regressing yields on $PC^{(c)}$ s and associated correlations

Panel A		Yield levels															Yield differences														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
US	1y	0.71	0.20	0.05	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.18	0.10	0.06	0.00	0.15	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
	2y	0.78	0.17	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.21	0.12	0.03	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3y	0.84	0.14	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.23	0.12	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	4y	0.87	0.11	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.23	0.12	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	5y	0.90	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.23	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6y	0.91	0.07	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.23	0.12	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.92	0.06	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.22	0.12	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.93	0.05	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.21	0.11	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.93	0.04	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.20	0.11	0.02	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	R_a^2	0.87	0.10	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.22	0.11	0.02	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
UK	1y	0.88	0.01	0.01	0.09	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.34	0.03	0.13	0.11	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2y	0.93	0.01	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.36	0.04	0.06	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3y	0.96	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.36	0.05	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4y	0.97	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.36	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5y	0.97	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.34	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6y	0.96	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.31	0.05	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.96	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.28	0.05	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.95	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.25	0.05	0.06	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.94	0.00	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.22	0.05	0.08	0.06	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	R_a^2	0.95	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.31	0.05	0.05	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GER	1y	0.70	0.22	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.00	0.28	0.19	0.08	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2y	0.76	0.18	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.34	0.09	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	3y	0.82	0.15	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.36	0.03	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4y	0.86	0.13	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.00	0.37	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5y	0.88	0.11	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.01	0.37	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6y	0.89	0.09	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.01	0.36	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.89	0.08	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.01	0.34	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.89	0.08	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.01	0.32	0.07	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.88	0.07	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.01	0.29	0.09	0.05	0.01	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	R_a^2	0.84	0.12	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.01	0.34	0.06	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 11: In Panel A we report the R^2 obtained from the regression of each time series of U.S., U.K. and German yields on the associated common principal components ($PC^{(c)}$ s). In Panel B (following table) we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

Panel <i>B</i>	Yield levels															Yield differences														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>US</i>	1y	0.84	0.45	-0.23	-0.11	0.14	0.05	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.69	-0.42	-0.32	0.24	-0.03	-0.39	0.02	0.04	-0.16	-0.01	-0.04	0.00	0.00	0.00	0.00
	2y	0.88	0.41	-0.20	-0.04	0.08	0.02	0.00	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.76	-0.46	-0.34	0.17	-0.02	-0.23	-0.03	-0.01	0.04	0.00	0.06	0.00	0.00	0.00	0.01
	3y	0.91	0.37	-0.16	0.00	0.03	0.01	-0.01	-0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.79	-0.48	-0.35	0.11	-0.01	-0.11	-0.03	-0.02	0.10	0.01	0.03	0.00	0.00	0.00	-0.01
	4y	0.93	0.33	-0.12	0.04	-0.01	0.00	-0.01	-0.02	-0.02	0.00	0.00	0.00	0.00	0.00	0.80	-0.48	-0.35	0.06	-0.01	-0.01	-0.03	-0.02	0.10	0.01	-0.01	0.00	0.00	0.00	-0.01
	5y	0.95	0.30	-0.09	0.06	-0.04	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.80	-0.48	-0.34	0.01	0.00	0.06	-0.01	-0.01	0.07	0.00	-0.04	0.00	0.00	0.00	0.00
	6y	0.96	0.27	-0.06	0.08	-0.07	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.80	-0.48	-0.34	-0.03	0.00	0.11	0.00	0.00	0.03	0.00	-0.04	0.00	0.00	0.00	0.01
	7y	0.96	0.24	-0.04	0.10	-0.09	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	-0.47	-0.34	-0.07	0.01	0.16	0.02	0.00	-0.02	0.00	-0.02	0.00	0.00	0.00	0.01
	8y	0.96	0.22	-0.02	0.11	-0.11	-0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.78	-0.46	-0.34	-0.10	0.01	0.20	0.03	0.01	-0.07	-0.01	0.01	0.00	0.00	0.00	0.00
	9y	0.96	0.20	0.00	0.12	-0.12	-0.01	0.01	0.02	0.02	0.00	-0.01	0.00	0.00	0.00	0.77	-0.45	-0.33	-0.13	0.02	0.23	0.04	0.02	-0.11	-0.01	0.05	0.00	0.00	0.00	-0.01
<i>UK</i>	1y	0.94	0.09	0.11	-0.30	0.00	-0.08	0.04	0.03	-0.02	0.00	0.00	0.00	0.00	0.00	0.57	0.59	-0.18	0.36	-0.33	0.10	0.04	0.20	0.03	0.00	0.00	-0.03	0.00	0.00	0.00
	2y	0.97	0.08	0.12	-0.20	0.01	-0.06	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.68	0.60	-0.21	0.25	-0.24	0.07	-0.01	-0.03	0.00	-0.01	0.00	0.06	0.00	-0.02	0.00
	3y	0.98	0.05	0.14	-0.13	0.01	-0.03	-0.02	-0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.73	0.60	-0.21	0.15	-0.14	0.04	-0.02	-0.11	-0.02	0.00	0.00	0.03	0.00	0.01	0.00
	4y	0.98	0.03	0.16	-0.07	0.01	-0.01	-0.02	-0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.76	0.60	-0.22	0.05	-0.05	0.01	-0.02	-0.11	-0.02	0.00	0.00	-0.01	0.00	0.01	0.00
	5y	0.98	0.02	0.17	-0.04	0.01	0.01	-0.02	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.78	0.58	-0.22	-0.04	0.03	-0.02	-0.02	-0.08	-0.02	0.00	0.00	-0.04	0.00	0.00	0.00
	6y	0.98	0.01	0.19	-0.01	0.01	0.03	-0.01	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.78	0.56	-0.23	-0.12	0.10	-0.04	0.00	-0.03	-0.01	0.00	0.00	-0.04	0.00	-0.01	0.00
	7y	0.98	0.00	0.20	0.02	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.53	-0.23	-0.19	0.16	-0.05	0.01	0.02	0.01	0.00	0.00	-0.02	0.00	-0.01	0.00
	8y	0.97	-0.01	0.22	0.04	0.01	0.06	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.77	0.50	-0.23	-0.24	0.21	-0.06	0.02	0.07	0.02	0.00	0.00	0.01	0.00	0.00	0.00
	9y	0.97	-0.01	0.23	0.06	0.01	0.08	0.01	0.02	-0.02	0.00	-0.01	0.00	0.00	0.00	0.75	0.47	-0.23	-0.28	0.24	-0.07	0.02	0.11	0.03	0.00	0.00	0.05	0.00	0.01	0.00
<i>GER</i>	1y	0.84	-0.47	-0.19	-0.18	-0.09	0.07	0.04	-0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.58	0.02	0.53	0.44	0.28	0.06	0.33	-0.02	0.01	0.07	0.00	0.00	0.01	0.00	0.00
	2y	0.87	-0.43	-0.17	-0.13	-0.06	0.03	-0.01	0.00	0.00	-0.01	0.00	-0.01	0.00	0.00	0.71	-0.02	0.59	0.31	0.22	0.06	-0.03	0.00	0.01	-0.10	0.00	0.00	-0.02	0.00	0.00
	3y	0.91	-0.39	-0.14	-0.07	-0.03	0.00	-0.03	0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.75	-0.04	0.60	0.18	0.14	0.05	-0.16	0.01	0.00	-0.05	0.00	0.00	0.01	0.00	0.00
	4y	0.93	-0.35	-0.11	-0.02	0.00	-0.01	-0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.77	-0.06	0.61	0.06	0.05	0.03	-0.17	0.02	-0.01	0.02	0.00	0.00	0.02	0.00	0.00
	5y	0.94	-0.33	-0.08	0.04	0.03	-0.02	-0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.78	-0.07	0.61	-0.04	-0.02	0.01	-0.14	0.02	-0.02	0.06	0.00	0.00	0.00	0.00	0.00
	6y	0.94	-0.31	-0.05	0.09	0.05	-0.03	-0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.78	-0.08	0.60	-0.12	-0.09	-0.02	-0.07	0.01	-0.01	0.07	0.00	0.00	-0.01	0.00	0.00
	7y	0.95	-0.29	-0.03	0.13	0.06	-0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	-0.09	0.58	-0.20	-0.15	-0.04	0.02	0.00	0.00	0.04	0.00	0.00	-0.01	0.00	0.00
	8y	0.94	-0.27	-0.01	0.17	0.07	-0.03	0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.75	-0.10	0.56	-0.26	-0.19	-0.06	0.11	-0.01	0.01	-0.01	0.00	0.00	-0.01	0.00	0.00
	9y	0.94	-0.26	0.00	0.20	0.08	-0.03	0.04	-0.02	0.01	-0.01	0.00	0.00	0.00	0.00	0.71	-0.10	0.53	-0.30	-0.23	-0.08	0.19	-0.02	0.03	-0.08	0.00	0.00	0.02	0.00	0.00

Panel A		Yield levels															Yield differences															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
US	1y	0.70	0.24	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.05	0.21	0.01	0.05	0.15	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	
	2y	0.78	0.20	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.06	0.25	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	3y	0.83	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.06	0.26	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
	4y	0.87	0.13	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.06	0.27	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
	5y	0.89	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.06	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	6y	0.91	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.06	0.26	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.92	0.06	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.05	0.26	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.93	0.04	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.05	0.25	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.93	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.05	0.23	0.00	0.02	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	R_a^2	0.86	0.11	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.06	0.25	0.00	0.01	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UK	1y	0.89	0.00	0.07	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.04	0.31	0.01	0.22	0.02	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	2y	0.94	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.05	0.33	0.00	0.11	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	3y	0.97	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.05	0.33	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	4y	0.97	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.05	0.32	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	5y	0.98	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.05	0.30	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	6y	0.98	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.05	0.28	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	7y	0.97	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.05	0.25	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	8y	0.97	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.05	0.22	0.00	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	9y	0.96	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.04	0.20	0.01	0.12	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	R_a^2	0.96	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.05	0.28	0.00	0.07	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
JAP	1y	0.84	0.11	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.46	0.00	0.26	0.01	0.00	0.14	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
	2y	0.86	0.11	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.61	0.00	0.21	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
	3y	0.88	0.10	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.70	0.00	0.08	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	4y	0.89	0.09	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.74	0.00	0.01	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	5y	0.90	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.75	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	6y	0.91	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.74	0.00	0.03	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
	7y	0.91	0.08	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.70	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	8y	0.91	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.64	0.00	0.13	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	9y	0.91	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.56	0.00	0.18	0.01	0.00	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
	R_a^2	0.89	0.09	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.66	0.00	0.11	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table 12: In Panel A we report the R^2 obtained from the regression of each time series of U.S., U.K. and Japanese yields on the associated common principal components ($PC^{(c)}s$). In Panel B (following table) we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

Panel B	Yield levels															Yield differences														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
US	1y	0.84	0.49	0.03	-0.20	0.12	0.04	0.02	0.01	0.03	0.00	0.00	-0.01	0.00	0.00	0.71	-0.22	-0.46	0.07	-0.23	-0.39	0.01	0.06	-0.16	-0.01	-0.04	0.00	0.00	0.00	0.00
	2y	0.88	0.45	0.06	-0.12	0.08	0.01	0.00	-0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.78	-0.25	-0.50	0.06	-0.16	-0.23	-0.01	-0.01	0.04	0.00	0.06	0.00	0.00	0.00	0.01
	3y	0.91	0.40	0.07	-0.06	0.03	0.00	-0.01	-0.01	-0.02	0.00	0.00	0.00	0.00	0.00	0.80	-0.25	-0.51	0.04	-0.10	-0.11	-0.01	-0.03	0.10	0.00	0.03	0.00	0.00	0.00	-0.01
	4y	0.93	0.35	0.08	-0.01	-0.01	-0.01	-0.01	-0.01	-0.02	0.00	0.00	0.00	0.00	0.00	0.81	-0.25	-0.52	0.02	-0.05	-0.02	-0.01	-0.03	0.10	0.00	-0.01	0.00	0.00	0.00	-0.01
	5y	0.95	0.31	0.08	0.03	-0.04	-0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.81	-0.25	-0.52	0.00	0.00	0.06	0.00	-0.02	0.07	0.00	-0.04	0.00	0.00	0.00	0.00
	6y	0.95	0.27	0.08	0.05	-0.06	-0.01	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	0.81	-0.24	-0.51	-0.01	0.04	0.11	0.00	-0.01	0.03	0.00	-0.04	0.00	0.00	0.00	0.01
	7y	0.96	0.24	0.09	0.08	-0.08	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.81	-0.23	-0.51	-0.02	0.08	0.16	0.01	0.01	-0.02	0.00	-0.02	0.00	0.00	0.00	0.01
	8y	0.96	0.21	0.09	0.09	-0.09	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.80	-0.23	-0.50	-0.03	0.11	0.20	0.01	0.02	-0.07	0.00	0.01	0.00	0.00	0.00	0.00
	9y	0.97	0.18	0.09	0.11	-0.10	0.00	0.01	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.79	-0.22	-0.48	-0.04	0.14	0.23	0.02	0.03	-0.11	0.00	0.05	0.00	0.00	0.00	-0.01
UK	1y	0.95	0.06	-0.26	-0.16	-0.05	-0.05	0.04	0.02	-0.02	0.00	-0.01	0.00	0.00	0.00	0.59	-0.19	0.56	0.09	-0.47	0.15	0.01	0.21	0.04	0.00	0.00	-0.03	0.00	0.00	0.00
	2y	0.97	0.05	-0.22	-0.07	-0.02	-0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.70	-0.23	0.57	0.06	-0.33	0.11	-0.01	-0.03	-0.01	0.00	0.00	0.06	0.00	-0.02	0.00
	3y	0.98	0.03	-0.18	0.00	0.00	-0.03	-0.02	-0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.75	-0.23	0.57	0.04	-0.19	0.06	-0.01	-0.11	-0.03	0.00	0.00	0.03	0.00	0.01	0.00
	4y	0.99	0.00	-0.15	0.04	0.01	-0.01	-0.02	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.78	-0.23	0.57	0.02	-0.07	0.02	-0.01	-0.11	-0.03	0.00	0.00	-0.01	0.00	0.01	0.00
	5y	0.99	-0.02	-0.13	0.07	0.02	0.00	-0.02	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.80	-0.23	0.55	-0.01	0.05	-0.02	-0.01	-0.08	-0.02	0.00	0.00	-0.04	0.00	0.00	0.00
	6y	0.99	-0.04	-0.11	0.10	0.03	0.02	-0.01	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.80	-0.22	0.53	-0.03	0.15	-0.05	0.00	-0.03	-0.01	0.00	0.00	-0.04	0.00	-0.01	0.00
	7y	0.99	-0.06	-0.10	0.12	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	-0.22	0.50	-0.05	0.23	-0.08	0.00	0.02	0.01	0.00	0.00	-0.02	0.00	-0.01	0.00
	8y	0.98	-0.07	-0.08	0.14	0.04	0.05	0.01	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.79	-0.22	0.47	-0.06	0.30	-0.09	0.00	0.07	0.02	0.00	0.00	0.01	0.00	0.00	0.00
	9y	0.98	-0.09	-0.07	0.15	0.04	0.06	0.02	0.01	-0.02	0.00	0.01	0.00	0.00	0.00	0.77	-0.21	0.45	-0.07	0.35	-0.11	0.00	0.11	0.04	-0.01	0.00	0.05	0.00	0.01	0.00
JAP	1y	0.92	-0.34	0.02	-0.16	-0.11	0.06	0.02	-0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.37	0.68	0.03	0.51	0.07	0.00	0.37	0.00	0.00	0.09	0.00	0.00	0.01	0.00	0.00
	2y	0.93	-0.33	0.04	-0.14	-0.07	0.04	-0.01	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.40	0.78	0.01	0.46	0.08	0.02	0.00	-0.01	0.00	-0.10	0.00	0.00	-0.03	0.00	0.00
	3y	0.94	-0.32	0.06	-0.11	-0.03	0.02	-0.02	0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.43	0.84	0.00	0.29	0.05	0.01	-0.16	0.00	0.00	-0.06	0.00	0.00	0.01	0.00	0.00
	4y	0.95	-0.31	0.08	-0.07	0.01	0.00	-0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.86	-0.01	0.12	0.02	0.01	-0.20	0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.00
	5y	0.95	-0.30	0.09	-0.04	0.03	-0.02	-0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.87	-0.02	-0.04	-0.01	0.00	-0.17	0.01	0.00	0.06	0.00	0.00	0.01	0.00	0.00
	6y	0.95	-0.28	0.10	-0.01	0.05	-0.03	-0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.47	0.86	-0.02	-0.17	-0.03	0.00	-0.10	0.01	0.00	0.07	0.00	0.00	-0.01	0.00	0.00
	7y	0.95	-0.28	0.10	0.02	0.06	-0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.47	0.84	-0.01	-0.28	-0.06	-0.01	0.00	0.00	0.00	0.04	0.00	0.00	-0.02	0.00	0.00
	8y	0.95	-0.27	0.10	0.04	0.06	-0.04	0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.80	0.00	-0.37	-0.07	-0.01	0.12	-0.01	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00
	9y	0.96	-0.26	0.10	0.06	0.06	-0.04	0.04	-0.03	0.01	-0.01	0.00	0.00	0.00	0.00	0.43	0.75	0.01	-0.43	-0.08	-0.01	0.23	-0.01	0.01	-0.10	0.00	0.00	0.02	0.00	0.00

Panel A		Yield levels															Yield differences															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
US	1y	0.63	0.30	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.14	0.15	0.01	0.04	0.16	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	2y	0.71	0.26	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.17	0.18	0.01	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	3y	0.77	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.18	0.18	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	4y	0.81	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	5y	0.84	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	6y	0.86	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.17	0.18	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.88	0.11	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.16	0.18	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.89	0.09	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.15	0.18	0.00	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.89	0.08	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.15	0.17	0.00	0.01	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	R_a^2	0.81	0.17	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.16	0.18	0.00	0.01	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GER	1y	0.75	0.12	0.06	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.00	0.24	0.05	0.21	0.01	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	2y	0.81	0.09	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.00	0.30	0.04	0.10	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
	3y	0.86	0.07	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.01	0.32	0.02	0.03	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	4y	0.90	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.01	0.32	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	5y	0.91	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.01	0.31	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	6y	0.92	0.03	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.01	0.30	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	7y	0.91	0.03	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.01	0.28	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	8y	0.91	0.02	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.01	0.26	0.02	0.07	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	9y	0.90	0.02	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.01	0.23	0.03	0.10	0.02	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	
	R_a^2	0.88	0.05	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.01	0.28	0.02	0.07	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
JAP	1y	0.85	0.04	0.09	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.41	0.03	0.21	0.05	0.00	0.14	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
	2y	0.87	0.03	0.08	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.53	0.02	0.18	0.04	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
	3y	0.90	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.60	0.03	0.07	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	4y	0.92	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.64	0.03	0.01	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	5y	0.93	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.64	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	6y	0.93	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.63	0.03	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	7y	0.93	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.60	0.03	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	8y	0.93	0.02	0.04	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.55	0.03	0.12	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	9y	0.93	0.02	0.04	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.48	0.02	0.16	0.03	0.00	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
	R_a^2	0.91	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.56	0.03	0.09	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Table 13: In Panel A we report the R^2 obtained from the regression of each time series of U.S., German and Japanese yields on the associated common principal components ($PC^{(c)}s$). In Panel B (following table) we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

Panel B	Yield levels															Yield differences														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
US	1y	0.80	0.55	0.06	0.20	0.14	0.03	0.03	-0.02	-0.02	0.00	0.00	-0.01	0.00	0.00	0.69	-0.37	0.39	0.11	-0.19	-0.40	-0.01	-0.02	-0.16	-0.01	0.01	0.04	0.00	0.00	0.00
	2y	0.84	0.51	0.06	0.12	0.08	0.01	0.00	0.00	0.01	-0.01	0.00	0.01	0.00	0.00	0.75	-0.41	0.42	0.08	-0.13	-0.24	-0.01	0.03	0.04	0.00	0.00	-0.06	0.00	0.00	0.01
	3y	0.88	0.47	0.05	0.06	0.03	0.00	-0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.78	-0.42	0.43	0.05	-0.08	-0.11	-0.01	0.03	0.10	0.00	-0.01	-0.03	0.00	0.00	-0.01
	4y	0.90	0.43	0.03	0.02	-0.01	-0.01	-0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.79	-0.42	0.43	0.02	-0.03	-0.02	-0.01	0.02	0.10	0.00	-0.01	0.01	0.00	0.00	-0.01
	5y	0.92	0.39	0.02	-0.02	-0.04	-0.01	-0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.80	-0.42	0.43	0.00	0.01	0.05	0.00	0.01	0.07	0.00	-0.01	0.04	0.00	0.00	0.00
	6y	0.93	0.36	0.01	-0.05	-0.07	-0.01	-0.01	0.01	0.00	0.00	0.00	-0.01	0.00	0.00	0.79	-0.41	0.43	-0.02	0.04	0.11	0.00	0.00	0.03	0.00	0.00	0.04	0.00	0.00	0.01
	7y	0.94	0.33	-0.01	-0.07	-0.09	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	-0.40	0.42	-0.04	0.07	0.16	0.01	-0.02	-0.02	0.00	0.00	0.02	0.00	0.00	0.01
	8y	0.94	0.31	-0.02	-0.09	-0.10	-0.01	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.78	-0.39	0.42	-0.05	0.10	0.20	0.01	-0.03	-0.07	0.00	0.01	-0.01	0.00	0.00	0.00
	9y	0.95	0.28	-0.03	-0.10	-0.11	-0.01	0.01	-0.02	-0.02	0.00	0.00	0.01	0.00	0.00	0.77	-0.38	0.41	-0.07	0.12	0.23	0.02	-0.05	-0.12	0.00	0.01	-0.05	0.00	0.00	-0.01
GER	1y	0.87	-0.35	0.24	0.23	-0.06	-0.08	0.05	0.02	0.00	0.00	-0.01	0.00	0.00	0.00	0.61	-0.01	-0.49	0.23	-0.46	0.10	-0.01	-0.32	0.01	-0.01	-0.07	0.00	0.00	-0.01	0.00
	2y	0.90	-0.31	0.23	0.18	-0.05	-0.04	-0.01	0.00	0.00	-0.01	0.01	0.00	0.00	0.00	0.73	-0.07	-0.55	0.19	-0.31	0.10	0.01	0.03	0.01	0.02	0.10	0.00	0.00	0.02	0.00
	3y	0.93	-0.27	0.23	0.11	-0.02	-0.01	-0.03	-0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.77	-0.09	-0.56	0.12	-0.18	0.07	0.01	0.16	-0.01	0.01	0.05	0.00	0.00	-0.01	0.00
	4y	0.95	-0.23	0.22	0.04	0.00	0.02	-0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.80	-0.10	-0.56	0.05	-0.06	0.04	0.01	0.17	-0.02	0.00	-0.02	0.00	0.00	-0.02	0.00
	5y	0.96	-0.20	0.21	-0.02	0.01	0.03	-0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.81	-0.11	-0.56	-0.01	0.05	0.00	0.01	0.14	-0.02	-0.01	-0.06	0.00	0.00	0.00	0.00
	6y	0.96	-0.18	0.20	-0.08	0.03	0.04	-0.01	-0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.81	-0.11	-0.55	-0.07	0.14	-0.03	0.00	0.07	-0.01	-0.01	-0.07	0.00	0.00	0.01	0.00
	7y	0.96	-0.16	0.20	-0.13	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	-0.10	-0.53	-0.12	0.21	-0.07	0.00	-0.02	0.00	-0.01	-0.04	0.00	0.00	0.01	0.00
	8y	0.95	-0.15	0.20	-0.17	0.04	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.78	-0.10	-0.51	-0.16	0.27	-0.10	-0.01	-0.11	0.01	0.00	0.01	0.00	0.00	0.01	0.00
	9y	0.95	-0.13	0.20	-0.21	0.05	0.03	0.04	0.02	0.00	-0.01	0.01	0.00	0.00	0.00	0.75	-0.09	-0.48	-0.19	0.32	-0.13	-0.02	-0.19	0.03	0.02	0.08	0.00	0.00	-0.02	0.00
JAP	1y	0.92	-0.19	-0.30	0.11	-0.07	0.10	0.03	-0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.39	0.64	0.17	0.46	0.21	-0.03	0.37	-0.02	0.00	0.09	-0.01	0.00	0.01	0.00	0.00
	2y	0.93	-0.19	-0.28	0.09	-0.04	0.08	0.01	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.46	0.73	0.16	0.42	0.19	0.00	0.00	-0.01	0.01	-0.10	0.01	0.00	-0.03	0.00	0.00
	3y	0.95	-0.18	-0.25	0.06	0.00	0.04	-0.01	0.01	-0.01	-0.01	-0.01	0.00	0.00	0.00	0.50	0.78	0.16	0.27	0.12	0.01	-0.16	0.00	0.00	-0.06	0.01	0.00	0.01	0.00	0.00
	4y	0.96	-0.18	-0.23	0.03	0.02	0.01	-0.02	0.01	-0.02	0.00	0.00	0.00	0.00	0.00	0.53	0.80	0.17	0.11	0.04	0.01	-0.20	0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.00
	5y	0.96	-0.17	-0.21	0.00	0.04	-0.02	-0.02	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.54	0.80	0.17	-0.04	-0.02	0.01	-0.17	0.01	-0.01	0.06	-0.01	0.00	0.01	0.00	0.00
	6y	0.96	-0.16	-0.20	-0.03	0.05	-0.04	-0.01	0.01	-0.01	0.01	0.00	0.00	0.00	0.00	0.55	0.79	0.17	-0.16	-0.07	0.00	-0.10	0.01	-0.01	0.07	-0.01	0.00	-0.01	0.00	0.00
	7y	0.97	-0.15	-0.19	-0.05	0.05	-0.06	-0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.54	0.77	0.17	-0.26	-0.12	0.00	0.00	0.01	0.00	0.04	-0.01	0.00	-0.02	0.00	0.00
	8y	0.97	-0.14	-0.19	-0.07	0.05	-0.07	0.00	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.52	0.74	0.16	-0.34	-0.15	-0.01	0.12	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00
	9y	0.96	-0.13	-0.19	-0.09	0.04	-0.08	0.02	-0.03	0.02	-0.01	-0.01	0.00	0.00	0.00	0.49	0.69	0.15	-0.40	-0.17	-0.02	0.24	0.00	0.01	-0.10	0.02	0.00	0.02	0.00	0.00

Panel A		Yield levels															Yield differences														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
UK	1y	0.84	0.05	0.03	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.15	0.18	0.07	0.08	0.11	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00
	2y	0.89	0.04	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.18	0.20	0.03	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3y	0.92	0.03	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.19	0.20	0.01	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	4y	0.94	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.19	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	5y	0.95	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.19	0.20	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	6y	0.95	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.18	0.19	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.95	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.17	0.18	0.02	0.02	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.95	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.16	0.17	0.03	0.03	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.94	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.15	0.16	0.04	0.04	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	R_a^2	0.92	0.03	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.17	0.19	0.02	0.03	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GER	1y	0.78	0.15	0.01	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.00	0.18	0.12	0.09	0.08	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2y	0.84	0.13	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.01	0.26	0.07	0.04	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	3y	0.88	0.10	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.01	0.29	0.03	0.01	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4y	0.91	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.01	0.31	0.01	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5y	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.01	0.32	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6y	0.93	0.06	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.01	0.31	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.92	0.05	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.01	0.31	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.91	0.04	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.01	0.29	0.04	0.02	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.90	0.04	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.01	0.27	0.06	0.03	0.05	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	R_a^2	0.89	0.08	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.01	0.28	0.04	0.02	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JAP	1y	0.89	0.02	0.07	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.37	0.04	0.13	0.12	0.00	0.14	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	2y	0.91	0.02	0.06	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.50	0.03	0.11	0.10	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	3y	0.93	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.58	0.03	0.05	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4y	0.95	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.62	0.03	0.01	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5y	0.95	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.63	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6y	0.96	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.62	0.03	0.02	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7y	0.96	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.58	0.03	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	8y	0.95	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.53	0.03	0.07	0.07	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	9y	0.95	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.46	0.03	0.10	0.09	0.00	0.06	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	R_a^2	0.94	0.01	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.54	0.03	0.06	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 14: In Panel A we report the R^2 obtained from the regression of each time series of U.K., German and Japanese yields on the associated common principal components ($PC^{(c)}s$). In Panel B (following table) we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

Panel <i>B</i>		Yield levels															Yield differences														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<i>UK</i>	1y	0.92	-0.21	0.19	0.28	-0.01	0.04	0.05	0.01	0.02	0.00	0.00	-0.01	0.00	0.00	0.60	-0.39	0.43	0.27	-0.29	0.33	0.00	-0.03	-0.21	0.00	0.00	-0.03	0.00	0.00	0.00	0.00
	2y	0.94	-0.19	0.20	0.18	0.00	0.04	0.01	0.00	-0.01	0.00	0.00	0.01	0.00	0.00	0.69	-0.43	0.45	0.19	-0.20	0.23	-0.02	0.02	-0.03	0.00	0.01	0.06	0.00	0.00	0.02	
	3y	0.96	-0.18	0.19	0.10	0.01	0.02	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.74	-0.44	0.45	0.11	-0.12	0.14	-0.02	0.03	0.11	0.00	0.00	0.03	0.00	0.00	-0.01	
	4y	0.97	-0.17	0.17	0.04	0.01	0.00	-0.02	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.76	-0.44	0.45	0.04	-0.04	0.05	-0.01	0.02	0.12	0.00	0.00	-0.01	0.00	0.00	-0.01	
	5y	0.97	-0.16	0.16	0.00	0.01	-0.01	-0.02	-0.01	-0.01	0.00	0.00	-0.01	0.00	0.00	0.78	-0.43	0.45	-0.02	0.03	-0.03	0.00	0.01	0.08	0.00	-0.01	-0.04	0.00	0.00	0.00	
	6y	0.98	-0.16	0.14	-0.04	0.01	-0.03	-0.02	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.78	-0.42	0.44	-0.08	0.09	-0.10	0.00	0.00	0.03	0.00	-0.01	-0.04	0.00	0.00	0.01	
	7y	0.97	-0.17	0.13	-0.06	0.01	-0.04	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	-0.41	0.42	-0.13	0.14	-0.16	0.00	-0.01	-0.02	0.00	0.00	-0.02	0.00	0.00	0.01	
	8y	0.97	-0.17	0.11	-0.09	0.01	-0.05	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.75	-0.40	0.41	-0.17	0.18	-0.20	0.00	-0.02	-0.07	0.00	0.00	0.01	0.00	0.00	0.00	
	9y	0.97	-0.18	0.10	-0.11	0.01	-0.06	0.00	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.73	-0.39	0.40	-0.21	0.21	-0.24	0.00	-0.03	-0.11	0.00	0.01	0.05	0.00	0.00	-0.01	
<i>GER</i>	1y	0.89	0.39	-0.08	0.21	0.08	-0.07	0.03	0.01	-0.02	0.00	0.01	0.00	0.00	0.00	0.64	-0.07	-0.43	0.35	-0.30	-0.28	-0.01	-0.32	0.02	-0.01	-0.07	0.00	0.00	-0.01	0.00	
	2y	0.92	0.36	-0.04	0.17	0.04	-0.02	-0.01	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.75	-0.10	-0.51	0.26	-0.19	-0.22	0.01	0.03	0.00	0.02	0.10	0.00	0.00	0.02	0.00	
	3y	0.94	0.32	0.00	0.10	0.01	0.01	-0.03	0.00	0.01	0.00	-0.01	0.00	0.00	0.00	0.78	-0.12	-0.54	0.17	-0.10	-0.13	0.01	0.16	-0.01	0.01	0.05	0.00	0.00	-0.01	0.00	
	4y	0.96	0.29	0.03	0.04	-0.01	0.02	-0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.80	-0.12	-0.56	0.07	-0.03	-0.05	0.01	0.17	-0.01	0.00	-0.02	0.00	0.00	-0.02	0.00	
	5y	0.96	0.26	0.06	-0.02	-0.03	0.02	-0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.80	-0.12	-0.56	-0.01	0.03	0.02	0.01	0.14	-0.01	-0.01	-0.06	0.00	0.00	0.00	0.00	
	6y	0.96	0.24	0.09	-0.07	-0.04	0.02	-0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.80	-0.12	-0.56	-0.09	0.08	0.09	0.01	0.06	-0.01	-0.01	-0.07	0.00	0.00	0.01	0.00	
	7y	0.96	0.22	0.11	-0.12	-0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79	-0.11	-0.55	-0.15	0.12	0.15	0.00	-0.02	0.00	-0.01	-0.04	0.00	0.00	0.02	0.00	
	8y	0.96	0.21	0.12	-0.16	-0.04	0.01	0.03	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.77	-0.10	-0.54	-0.20	0.15	0.19	-0.01	-0.11	0.01	0.00	0.01	0.00	0.00	0.01	0.00	
	9y	0.95	0.20	0.13	-0.20	-0.04	0.00	0.04	0.00	-0.02	0.00	-0.01	0.00	0.00	0.00	0.73	-0.09	-0.52	-0.24	0.18	0.23	-0.02	-0.20	0.02	0.02	0.08	0.00	0.00	-0.02	0.00	
<i>JAP</i>	1y	0.94	-0.14	-0.26	0.11	-0.09	-0.05	0.01	-0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.43	0.61	0.20	0.36	0.35	0.05	0.37	-0.02	0.00	0.09	-0.01	0.00	0.01	0.00	0.00	
	2y	0.95	-0.12	-0.25	0.08	-0.07	-0.02	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.49	0.71	0.18	0.33	0.32	0.03	0.00	-0.01	0.01	-0.10	0.01	0.00	-0.03	0.00	0.00	
	3y	0.97	-0.10	-0.23	0.04	-0.04	0.00	-0.01	0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.52	0.76	0.17	0.21	0.20	0.01	-0.16	0.00	0.00	-0.06	0.01	0.00	0.01	0.00	0.00	
	4y	0.97	-0.08	-0.21	0.00	-0.01	0.02	-0.01	0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.54	0.79	0.16	0.09	0.08	0.00	-0.20	0.01	-0.01	0.01	0.00	0.00	0.02	0.00	0.00	
	5y	0.98	-0.07	-0.20	-0.04	0.01	0.03	-0.01	0.02	-0.01	0.00	0.00	0.00	0.00	0.00	0.56	0.79	0.16	-0.03	-0.03	-0.01	-0.17	0.01	-0.01	0.06	-0.01	0.00	0.01	0.00	0.00	
	6y	0.98	-0.07	-0.18	-0.06	0.03	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.56	0.78	0.17	-0.12	-0.12	-0.01	-0.10	0.01	0.00	0.07	-0.01	0.00	-0.01	0.00	0.00	
	7y	0.98	-0.07	-0.17	-0.09	0.05	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.55	0.76	0.17	-0.20	-0.20	-0.01	0.00	0.01	0.00	0.04	-0.01	0.00	-0.02	0.00	0.00	
	8y	0.98	-0.08	-0.15	-0.10	0.06	0.02	0.01	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.54	0.73	0.16	-0.27	-0.26	-0.01	0.12	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00	0.00	
	9y	0.97	-0.09	-0.14	-0.12	0.07	0.01	0.02	-0.04	0.01	-0.01	0.00	0.00	0.00	0.00	0.51	0.68	0.16	-0.31	-0.30	-0.01	0.24	0.00	0.01	-0.10	0.02	0.00	0.02	0.00	0.00	

The 4-country case. 1st step: Principal Component Analysis of international bond markets.

Table 15: We report principal component analysis of the term structure of interest rates of four countries taken separately and jointly. The first column lists the number of principal components (four for a single country, and fifteen for the 4-country case), while the rest of the table is divided into five vertical blocks. Each of the first, second, third and fourth blocks represents an individual country, while the fifth block represents the four countries jointly. The first and the second column (third and fourth, respectively) of each block report marginal and cumulative percent variance explained for yield levels (yield differences, respectively). For each country we use weekly yields observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

	PCs																$PC^{(c)}s$			
	$U.S.$				$U.K.$				JAP				GER				$U.S. - U.K. - GER - JAP$			
	Levels		Differences		Levels		Differences		Levels		Differences		Levels		Differences		Levels		Differences	
	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
1	97.22	97.22	93.55	93.55	98.10	98.10	89.96	89.96	96.86	96.86	87.59	87.59	98.72	98.72	84.67	84.67	88.26	88.26	44.62	44.62
2	2.70	99.93	5.42	98.97	1.80	99.90	8.81	98.77	3.00	99.86	9.33	96.91	1.18	99.91	11.34	96.01	6.48	94.74	19.02	63.64
3	0.07	100.00	0.88	99.85	0.09	99.99	1.09	99.87	0.14	99.99	2.67	99.58	0.09	99.99	3.47	99.48	2.63	97.37	13.42	77.06
4	0.00	100.00	0.14	99.99	0.01	100.00	0.12	99.99	0.01	100.00	0.40	99.98	0.01	100.00	0.48	99.97	1.20	98.57	12.03	89.09
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.92	99.49	3.16	92.25
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.27	99.76	2.68	94.92
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.13	99.89	1.65	96.57
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05	99.94	1.13	97.70
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.03	99.97	0.86	98.56
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	99.98	0.67	99.23
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	99.99	0.27	99.50
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	100.00	0.20	99.70
13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	100.00	0.12	99.82
14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	100.00	0.10	99.92
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.00	100.00	0.04	99.95

Table 16: In Panel *A* we report the R^2 obtained from the regression of each time series of U.S., U.K., Japanese and German yields on the associated common principal components ($PC^{(c)}s$). In Panel *B* (following table) we report the associated correlations. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

Panel <i>B</i>	Yield levels																				Yield differences																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>U.S.</i>	1y	0.81	0.53	0.11	0.18	0.07	-0.16	-0.02	0.03	0.01	-0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	-0.23	-0.43	-0.27	-0.21	0.13	-0.03	-0.39	-0.01	-0.02	-0.03	0.16	0.01	-0.01	-0.04	0.00	0.00	0.00	0.00	0.00
	2y	0.85	0.49	0.10	0.11	0.08	-0.09	-0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.73	-0.26	-0.47	-0.29	-0.15	0.09	-0.02	-0.23	-0.01	0.03	0.01	-0.04	0.00	0.00	0.06	0.00	0.00	0.00	0.00	-0.01
	3y	0.88	0.45	0.09	0.05	0.08	-0.04	0.00	0.00	-0.01	0.02	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	-0.27	-0.49	-0.29	-0.10	0.06	-0.01	-0.11	-0.01	0.03	0.02	-0.10	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.01
	4y	0.91	0.40	0.07	0.01	0.08	0.01	0.00	-0.01	-0.01	0.02	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	-0.27	-0.49	-0.29	-0.05	0.03	-0.01	-0.01	-0.01	0.03	0.02	-0.10	0.00	0.01	-0.01	0.00	0.00	0.00	0.00	0.01
	5y	0.92	0.37	0.06	-0.02	0.08	0.04	0.01	-0.01	0.00	0.02	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	-0.26	-0.49	-0.29	-0.01	0.01	0.00	0.06	0.00	0.01	0.01	-0.07	0.00	0.01	-0.04	0.00	0.00	0.00	0.00	0.00
	6y	0.94	0.33	0.04	-0.05	0.07	0.07	0.01	-0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.77	-0.26	-0.49	-0.29	0.03	-0.02	0.00	0.12	0.00	0.00	0.00	-0.03	0.00	0.00	-0.04	0.00	0.00	0.00	0.00	-0.01
	7y	0.94	0.30	0.03	-0.07	0.07	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	-0.25	-0.48	-0.29	0.06	-0.04	0.01	0.16	0.01	-0.02	0.00	0.02	0.00	0.00	-0.02	0.00	0.00	0.00	0.00	-0.01
	8y	0.95	0.28	0.01	-0.08	0.07	0.11	0.01	0.00	0.01	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.76	-0.24	-0.47	-0.29	0.09	-0.06	0.01	0.20	0.01	-0.03	-0.01	0.07	0.00	-0.01	0.01	0.00	0.00	0.00	0.00	0.00
	9y	0.95	0.26	0.00	-0.10	0.07	0.12	0.00	0.01	0.01	-0.02	-0.01	0.01	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.75	-0.23	-0.46	-0.29	0.11	-0.07	0.01	0.23	0.02	-0.04	-0.02	0.11	0.00	-0.01	0.05	0.00	0.00	0.00	0.00	0.01
<i>U.K.</i>	1y	0.93	0.14	-0.07	0.22	-0.22	0.02	-0.02	-0.04	0.05	0.00	-0.01	-0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.55	-0.20	0.58	-0.16	-0.28	0.23	-0.33	0.10	0.01	-0.04	-0.20	-0.03	0.00	0.00	0.00	-0.03	0.00	0.00	0.00	0.00
	2y	0.96	0.13	-0.05	0.12	-0.20	0.01	0.00	-0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.66	-0.24	0.59	-0.18	-0.20	0.16	-0.23	0.07	-0.01	0.01	0.03	0.00	0.00	-0.01	0.00	0.06	0.00	0.00	0.02	0.00
	3y	0.98	0.10	-0.05	0.05	-0.17	0.01	0.01	-0.03	-0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	-0.24	0.60	-0.19	-0.11	0.09	-0.14	0.04	-0.01	0.02	0.11	0.02	0.00	0.00	0.00	0.02	0.00	0.00	-0.01	0.00
	4y	0.98	0.08	-0.05	0.00	-0.16	0.00	0.01	-0.01	-0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	-0.24	0.59	-0.19	-0.04	0.03	-0.05	0.01	-0.01	0.02	0.11	0.02	0.00	0.00	0.00	-0.01	0.00	0.00	-0.01	0.00
	5y	0.99	0.06	-0.06	-0.04	-0.14	-0.01	0.02	0.00	-0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	-0.24	0.57	-0.20	0.03	-0.03	0.03	-0.02	-0.01	0.02	0.08	0.01	0.00	0.01	0.00	-0.04	0.00	0.00	0.00	0.00
	6y	0.98	0.04	-0.07	-0.07	-0.13	-0.01	0.02	0.02	-0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.76	-0.24	0.55	-0.20	0.10	-0.07	0.10	-0.04	0.00	0.00	0.03	0.01	0.00	0.00	0.00	-0.04	0.00	0.00	0.01	0.00
	7y	0.98	0.03	-0.09	-0.10	-0.12	-0.02	0.02	0.03	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	-0.23	0.52	-0.21	0.15	-0.12	0.16	-0.05	0.00	-0.01	-0.02	0.00	0.00	0.00	0.00	-0.02	0.00	0.00	0.01	0.00
	8y	0.98	0.02	-0.10	-0.12	-0.11	-0.02	0.02	0.04	0.00	0.00	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	-0.23	0.49	-0.21	0.19	-0.15	0.20	-0.06	0.00	-0.02	-0.07	-0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
	9y	0.98	0.02	-0.11	-0.14	-0.11	-0.03	0.02	0.05	0.00	0.00	-0.01	-0.02	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.73	-0.23	0.47	-0.21	0.23	-0.17	0.24	-0.07	0.00	-0.02	-0.11	-0.03	0.01	-0.01	0.00	0.05	0.00	0.00	-0.01	0.00
<i>GER</i>	1y	0.85	-0.38	0.26	0.22	0.03	0.05	0.09	0.05	0.03	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.59	0.06	0.03	0.51	-0.37	0.24	0.29	0.05	0.00	-0.32	0.02	-0.01	0.01	0.07	0.00	0.00	0.00	-0.01	0.00	0.00
	2y	0.89	-0.34	0.26	0.18	0.02	0.03	0.04	0.01	-0.01	0.00	0.00	0.00	0.00	0.00	-0.01	0.00	0.00	0.00	0.00	0.71	0.03	-0.01	0.58	-0.27	0.14	0.22	0.06	0.01	0.03	0.00	-0.01	-0.02	-0.10	0.00	0.00	0.00	0.02	0.00	0.00
	3y	0.92	-0.30	0.25	0.11	0.01	0.02	0.01	-0.01	-0.03	-0.01	0.00	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.75	0.02	-0.03	0.60	-0.16	0.07	0.14	0.05	0.02	0.15	-0.01	0.00	-0.01	-0.05	0.00	0.00	0.00	-0.01	0.00	0.00
	4y	0.94	-0.26	0.23	0.04	0.00	0.00	-0.02	-0.02	-0.03	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.01	-0.05	0.61	-0.07	0.01	0.05	0.03	0.01	0.17	-0.02	0.01	0.00	0.02	0.00	0.00	0.00	-0.02	0.00	0.00
	5y	0.95	-0.23	0.22	-0.02	0.00	-0.01	-0.03	-0.02	-0.02	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.01	-0.06	0.61	0.02	-0.03	-0.02	0.01	0.01	0.13	-0.02	0.02	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00
	6y	0.95	-0.21	0.22	-0.08	-0.01	-0.02	-0.04	-0.01	-0.01	0.00	0.00	-0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.78	0.01	-0.07	0.60	0.10	-0.07	-0.09	-0.02	0.00	0.07	-0.01	0.01	0.01	0.07	0.00	0.00	0.00	0.01	0.00	0.00
	7y	0.95	-0.19	0.21	-0.13	-0.01	-0.03	-0.04	-0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.02	-0.08	0.58	0.17	-0.10	-0.15	-0.04	0.00	-0.02	0.00	0.00	0.01	0.04	0.00	0.00	0.00	0.01	0.00	0.00
	8y	0.94	-0.18	0.21	-0.17	-0.01	-0.03	-0.04	0.00	0.03	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.02	-0.09	0.56	0.23	-0.12	-0.19	-0.06	-0.01	-0.11	0.01	-0.01	0.00	-0.01	0.00	0.00	0.00	0.01	0.00	0.00
	9y	0.94	-0.17	0.20	-0.21	-0.01	-0.03	-0.04	0.01	0.04	0.01	0.00	0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.72	0.02	-0.09	0.53	0.26	-0.14	-0.23	-0.08	-0.02	-0.19	0.02	-0.03	-0.02	-0.08	0.00	0.00	0.00	-0.02	0.00	0.00
<i>JAP</i>	1y	0.92	-0.20	-0.28	0.14	0.04	0.06	-0.08	0.04	0.01	0.00	0.03	-0.01	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.67	0.05	-0.18	-0.31	-0.40	-0.06	-0.02	0.37	-0.02	0.00	0.00	-0.09	0.01	0.00	0.00	0.01	0.00	0.00	0.00
	2y	0.93	-0.20	-0.25	0.12	0.06	0.03	-0.07	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00																							

Appendix 2: The *ELN*-Approach.

The 2-Country Case.

1st and 2nd step : Regressing *PC*s on *PC*^(c)s and Associated *R*² (Yield levels).

Table 17: For any given pair of countries, we report results from regressing the single-country yield curve principal components (*PC*s) on the first eight common *PC*^(c)s, extracted by pooling the term structure data of the two countries. In both Panel *A* and *B*, the first column represents the dependent variable in the regression, naming one of the first three principal components of a country. The next columns in Panel *A* report the regression coefficients associated with a regression using all of the first eight *PC*^(c)s, while the columns of Panel *B* report the *R*² when the dependent variable is regressed upon subsets of the first eight *PC*^(c)s. We use weekly yield levels observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

Panel <i>A</i>	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
<i>US</i> 1 st	0.7052	0.6566	-0.2432	0.1035	0.0398	0.0112	-0.0039	0.0004
<i>US</i> 2 nd	-0.0135	0.3613	0.6400	-0.6756	-0.0462	-0.0300	-0.0026	0.0094
<i>US</i> 3 rd	0.0014	-0.0252	0.0404	-0.0491	0.5361	0.8378	0.0739	0.0171
<i>UK</i> 1 st	0.7089	-0.6469	0.2509	-0.1190	-0.0400	-0.0144	0.0032	-0.0002
<i>UK</i> 2 nd	0.0032	0.1355	0.6826	0.7178	0.0087	0.0079	0.0018	-0.0198
<i>UK</i> 3 rd	0.0014	0.0273	-0.0257	0.0242	-0.8407	0.5363	0.0527	0.0265
Panel <i>B</i>	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
<i>US</i> 1 st	0.9562	0.9983	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>US</i> 2 nd	0.0126	0.4704	0.8813	0.9999	1.0000	1.0000	1.0000	1.0000
<i>US</i> 3 rd	0.0054	0.0937	0.1585	0.1833	0.6137	0.9996	1.0000	1.0000
<i>UK</i> 1 st	0.9577	0.9982	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 2 nd	0.0011	0.0977	0.7991	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 3 rd	0.0039	0.0801	0.0994	0.1038	0.8833	0.9998	1.0000	1.0000
Panel <i>A</i>	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
<i>US</i> 1 st	0.7076	0.6879	-0.0261	0.1590	0.0109	0.0016	0.0005	-0.0015
<i>US</i> 2 nd	-0.0213	0.1737	-0.6213	-0.7620	0.0504	-0.0128	-0.0002	0.0049
<i>US</i> 3 rd	0.0009	-0.0074	-0.0187	0.0062	0.1353	0.9872	0.0685	0.0443
<i>GER</i> 1 st	0.7061	-0.6882	-0.0129	-0.1664	-0.0062	-0.0042	-0.0005	0.0012
<i>GER</i> 2 nd	0.0184	0.1503	0.7819	-0.6043	-0.0040	0.0199	-0.0028	0.0112
<i>GER</i> 3 rd	-0.0024	-0.0192	0.0376	0.0327	0.9894	-0.1348	-0.0016	-0.0054
Panel <i>B</i>	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
<i>US</i> 1 st	0.8898	0.9997	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000
<i>US</i> 2 nd	0.0291	0.2808	0.7484	0.9999	1.0000	1.0000	1.0000	1.0000
<i>US</i> 3 rd	0.0021	0.0203	0.0370	0.0376	0.0706	0.9995	0.9999	1.0000
<i>GER</i> 1 st	0.8893	0.9997	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0196	0.1897	0.8574	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0071	0.0674	0.1012	0.1104	0.9914	1.0000	1.0000	1.0000
Panel <i>A</i>	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
<i>US</i> 1 st	0.7031	-0.6946	0.1016	-0.1094	-0.0130	-0.0248	-0.0047	0.0026
<i>US</i> 2 nd	-0.0237	-0.2231	-0.8672	0.4288	0.0738	0.0905	0.0091	-0.0047
<i>US</i> 3 rd	0.0022	0.0187	-0.0651	-0.0335	0.5290	-0.8407	-0.0848	0.0130
<i>JAP</i> 1 st	0.7106	0.6805	-0.1342	0.1136	0.0118	0.0298	0.0047	-0.0025
<i>JAP</i> 2 nd	-0.0074	0.0653	-0.4577	-0.8827	-0.0801	0.0216	0.0027	0.0137
<i>JAP</i> 3 rd	-0.0009	0.0062	-0.0769	0.1037	-0.8413	-0.5230	-0.0426	-0.0037
Panel <i>B</i>	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
<i>US</i> 1 st	0.8987	0.9997	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>US</i> 2 nd	0.0367	0.4114	0.9397	0.9997	0.9999	1.0000	1.0000	1.0000
<i>US</i> 3 rd	0.0125	0.1167	0.2345	0.2490	0.5520	0.9994	1.0000	1.0000
<i>JAP</i> 1 st	0.9041	0.9995	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0082	0.0816	0.4180	0.9996	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0017	0.0109	0.1416	0.2521	0.8621	0.9999	1.0000	1.0000

Table 17, continued.

Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
<i>GER</i> 1 st	0.7044	0.6886	-0.0952	0.1373	0.0285	-0.0286	0.0036	0.0043
<i>GER</i> 2 nd	0.0124	-0.2418	-0.7629	0.5810	0.1379	-0.0493	-0.0043	-0.0142
<i>GER</i> 3 rd	-0.0014	0.0226	-0.0449	-0.2040	0.8332	0.5112	0.0184	-0.0073
<i>UK</i> 1 st	0.7097	-0.6798	0.1126	-0.1415	-0.0266	0.0288	-0.0038	-0.0031
<i>UK</i> 2 nd	-0.0054	-0.0654	0.6274	0.7438	0.2206	-0.0049	-0.0025	-0.0061
<i>UK</i> 3 rd	0.0012	0.0177	-0.0201	0.1681	-0.4853	0.8517	0.0908	-0.0433
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
<i>GER</i> 1 st	0.9430	0.9995	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0095	0.2345	0.9333	0.9992	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0026	0.0456	0.0984	0.2760	0.8884	1.0000	1.0000	1.0000
<i>UK</i> 1 st	0.9450	0.9994	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 2 nd	0.0030	0.0303	0.8169	0.9967	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 3 rd	0.0029	0.0418	0.0576	0.2357	0.5425	0.9995	0.9999	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
<i>GER</i> 1 st	0.7033	0.7036	-0.0128	0.0990	0.0170	-0.0073	0.0017	-0.0032
<i>GER</i> 2 nd	0.0037	-0.0775	-0.9074	0.4053	0.0420	0.0664	-0.0030	0.0087
<i>GER</i> 3 rd	-0.0007	0.0135	-0.0162	-0.2022	0.8443	0.4937	0.0429	0.0135
<i>JAP</i> 1 st	0.7108	-0.6967	0.0208	-0.0930	-0.0141	0.0067	-0.0011	0.0035
<i>JAP</i> 2 nd	-0.0059	-0.1132	0.4181	0.8808	0.1608	0.1013	0.0091	0.0174
<i>JAP</i> 3 rd	0.0012	0.0232	0.0297	-0.0180	-0.5078	0.8599	0.0064	0.0314
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
<i>GER</i> 1 st	0.9486	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0009	0.0210	0.9687	0.9998	0.9999	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0006	0.0140	0.0207	0.1899	0.8992	0.9999	1.0000	1.0000
<i>JAP</i> 1 st	0.9506	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0054	0.1142	0.6242	0.9965	0.9995	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0031	0.0658	0.1012	0.1033	0.5125	0.9999	0.9999	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
<i>UK</i> 1 st	0.7059	0.6898	-0.0840	0.1306	-0.0266	0.0329	-0.0070	-0.0065
<i>UK</i> 2 nd	-0.0067	0.2194	0.7570	-0.5998	0.1325	-0.0312	0.0211	-0.0037
<i>UK</i> 3 rd	-0.0013	0.0350	-0.0517	-0.1642	-0.6686	-0.7187	-0.0298	0.0684
<i>JAP</i> 1 st	0.7083	-0.6855	0.0936	-0.1331	0.0248	-0.0336	0.0070	0.0072
<i>JAP</i> 2 nd	-0.0031	-0.0651	0.6387	0.7399	-0.1960	-0.0331	-0.0187	0.0208
<i>JAP</i> 3 rd	-0.0009	-0.0238	0.0202	-0.1747	-0.7017	0.6897	-0.0177	-0.0110
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
<i>UK</i> 1 st	0.9652	0.9998	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 2 nd	0.0048	0.1952	0.9195	0.9991	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 3 rd	0.0034	0.0971	0.1628	0.2786	0.6940	0.9998	0.9998	1.0000
<i>JAP</i> 1 st	0.9658	0.9997	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0015	0.0271	0.8125	0.9971	0.9999	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0020	0.0489	0.0597	0.2013	0.6958	1.0000	1.0000	1.0000

1st and 2nd Steps : Regressing PCs on $PC^{(c)}s$ and Associated R^2 (Yield differences)

Table 18: For any given pair of countries, we report results from regressing the single-country yield curve principal components (PCs) on the first eight common $PC^{(c)}s$, extracted by pooling the term structure data of the two countries. In both Panel A and B , the first column represents the dependent variable in the regression, naming one of the first three principal components of a country. The next columns in Panel A report the regression coefficients associated with a regression using all of the first eight $PC^{(c)}s$, while the columns of Panel B report the R^2 when the dependent variable is regressed upon subsets of the first eight $PC^{(c)}s$. We use weekly yield differences observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
US 1 st	0.7239	-0.6866	-0.0609	0.0286	0.0042	0.0026	-0.0014	-0.0064
US 2 nd	0.0035	0.0061	0.4043	0.9143	-0.0055	0.0173	-0.0032	-0.0116
US 3 rd	0.0012	0.0025	0.0294	-0.0290	0.2918	0.9552	-0.0015	0.0266
UK 1 st	0.6894	0.7237	0.0261	-0.0189	-0.0025	-0.0035	0.0021	0.0027
UK 2 nd	0.0270	-0.0694	0.9117	-0.4021	-0.0112	-0.0368	0.0091	0.0046
UK 3 rd	-0.0014	0.0033	0.0044	0.0091	0.9562	-0.2919	-0.0155	-0.0029
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
US 1 st	0.7300	0.9996	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
US 2 nd	0.0003	0.0007	0.2801	0.9999	1.0000	1.0000	1.0000	1.0000
US 3 rd	0.0002	0.0006	0.0097	0.0141	0.1220	0.9999	0.9999	1.0000
UK 1 st	0.6885	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
UK 2 nd	0.0108	0.0400	0.9142	0.9999	0.9999	1.0000	1.0000	1.0000
UK 3 rd	0.0002	0.0008	0.0010	0.0013	0.9339	1.0000	1.0000	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
US 1 st	0.7329	-0.6791	-0.0372	0.0169	0.0086	-0.0001	-0.0033	0.0003
US 2 nd	0.0033	0.0075	0.3676	0.9266	0.0788	0.0055	0.0062	-0.0008
US 3 rd	-0.0004	-0.0012	0.0241	-0.0276	0.1366	0.9855	0.0941	0.0017
GER 1 st	0.6802	0.7327	0.0166	-0.0146	-0.0045	0.0008	0.0016	-0.0010
GER 2 nd	0.0159	-0.0432	0.9288	-0.3655	-0.0293	-0.0287	-0.0027	0.0021
GER 3 rd	-0.0030	0.0075	-0.0047	-0.0813	0.9870	-0.1379	-0.0109	-0.0071
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
US 1 st	0.7520	0.9998	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
US 2 nd	0.0003	0.0008	0.2482	0.9969	1.0000	1.0000	1.0000	1.0000
US 3 rd	0.0000	0.0001	0.0066	0.0107	0.0676	0.9961	1.0000	1.0000
GER 1 st	0.6918	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
GER 2 nd	0.0035	0.0136	0.9320	0.9997	0.9999	1.0000	1.0000	1.0000
GER 3 rd	0.0005	0.0015	0.0016	0.0133	0.9940	1.0000	1.0000	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
US 1 st	0.7980	-0.6024	-0.0145	0.0028	-0.0009	0.0012	0.0030	0.0002
US 2 nd	0.0049	0.0094	0.0684	0.9971	0.0279	0.0014	-0.0119	0.0004
US 3 rd	0.0033	0.0063	0.0027	-0.0025	0.0417	0.9985	0.0343	0.0003
JAP 1 st	0.6025	0.7980	0.0023	-0.0106	-0.0004	-0.0071	-0.0007	-0.0006
JAP 2 nd	0.0098	-0.0113	0.9975	-0.0683	-0.0014	-0.0028	0.0001	-0.0054
JAP 3 rd	0.0007	-0.0008	-0.0006	-0.0279	0.9987	-0.0417	-0.0016	0.0030
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
US 1 st	0.7171	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
US 2 nd	0.0005	0.0016	0.0114	0.9995	1.0000	1.0000	1.0000	1.0000
US 3 rd	0.0013	0.0046	0.0047	0.0048	0.0116	0.9994	1.0000	1.0000
JAP 1 st	0.4516	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
JAP 2 nd	0.0009	0.0017	0.9978	1.0000	1.0000	1.0000	1.0000	1.0000
JAP 3 rd	0.0000	0.0000	0.0000	0.0012	0.9996	1.0000	1.0000	1.0000

Table 18, continued.

Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
<i>GER</i> 1 st	0.6960	-0.7171	-0.0268	0.0235	-0.0016	-0.0083	0.0007	-0.0004
<i>GER</i> 2 nd	-0.0020	-0.0082	0.7488	0.6626	-0.0125	-0.0012	0.0028	0.0056
<i>GER</i> 3 rd	-0.0014	-0.0032	-0.0144	0.0353	0.9921	0.1189	-0.0035	-0.0059
<i>UK</i> 1 st	0.7179	0.6959	0.0163	-0.0076	0.0033	0.0038	-0.0004	0.0002
<i>UK</i> 2 nd	0.0128	-0.0371	0.6619	-0.7476	0.0354	0.0051	-0.0115	-0.0021
<i>UK</i> 3 rd	-0.0031	0.0081	0.0013	-0.0010	0.1191	-0.9922	0.0346	0.0022
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
<i>GER</i> 1 st	0.6994	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0001	0.0004	0.6873	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0001	0.0003	0.0012	0.0043	0.9943	1.0000	1.0000	1.0000
<i>UK</i> 1 st	0.7244	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 2 nd	0.0023	0.0103	0.5782	0.9996	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 3 rd	0.0011	0.0042	0.0042	0.0042	0.0390	0.9996	1.0000	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
<i>GER</i> 1 st	0.7288	-0.6843	-0.0196	0.0061	0.0059	-0.0041	-0.0037	0.0004
<i>GER</i> 2 nd	-0.0016	-0.0036	0.3541	0.9350	-0.0172	-0.0036	-0.0006	0.0009
<i>GER</i> 3 rd	0.0057	0.0106	0.0332	-0.0175	-0.0574	-0.9974	-0.0192	0.0035
<i>JAP</i> 1 st	0.6846	0.7288	0.0071	0.0013	-0.0011	0.0119	0.0014	0.0010
<i>JAP</i> 2 nd	0.0106	-0.0189	0.9343	-0.3537	0.0031	0.0370	-0.0001	-0.0072
<i>JAP</i> 3 rd	-0.0033	0.0055	0.0052	0.0162	0.9981	-0.0575	-0.0022	-0.0075
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
<i>GER</i> 1 st	0.6644	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0000	0.0001	0.1568	0.9999	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0013	0.0039	0.0088	0.0098	0.0141	0.9999	1.0000	1.0000
<i>JAP</i> 1 st	0.6063	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0011	0.0031	0.9005	0.9997	0.9997	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0003	0.0009	0.0010	0.0017	0.9975	1.0000	1.0000	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
<i>UK</i> 1 st	0.7656	-0.6431	-0.0060	-0.0053	-0.0155	0.0006	-0.0012	-0.0004
<i>UK</i> 2 nd	0.0113	0.0199	0.1309	-0.9909	0.0221	-0.0004	-0.0005	0.0000
<i>UK</i> 3 rd	-0.0001	-0.0002	0.0041	0.0009	0.0368	0.9989	0.0285	-0.0021
<i>JAP</i> 1 st	0.6431	0.7654	-0.0017	0.0225	0.0024	0.0002	0.0003	0.0018
<i>JAP</i> 2 nd	0.0043	-0.0052	0.9914	0.1309	-0.0001	-0.0042	-0.0002	-0.0035
<i>JAP</i> 3 rd	0.0100	-0.0122	-0.0030	0.0217	0.9988	-0.0368	0.0003	0.0158
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8
<i>UK</i> 1 st	0.6687	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 2 nd	0.0015	0.0047	0.0268	0.9998	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 3 rd	0.0000	0.0000	0.0002	0.0002	0.0045	0.9996	1.0000	1.0000
<i>JAP</i> 1 st	0.5013	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0002	0.0003	0.9868	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0030	0.0061	0.0061	0.0073	0.9996	1.0000	1.0000	1.0000

3rd step : Extracting $PC^{(\ell)}s$ from $PC^{(c)}s$ -Based Yield Curve Residuals

Countries	$PC^{(\ell)}s$	Yield levels		Yield differences	
		after 1 $PC^{(c)}$	after 2 $PC^{(c)}s$	after 1 $PC^{(c)}$	after 2 $PC^{(c)}s$
<i>U.S.</i>	1	70.93	86.24	82.03	71.75
	2	28.27	12.69	15.01	25.21
	Cum.	99.20	98.93	97.04	96.96
<i>U.K.</i>	1	75.28	73.74	77.29	76.98
	2	23.36	22.42	19.98	21.50
	Cum.	98.64	96.16	97.27	98.48
<i>U.S.</i>	1	85.57	83.50	81.07	72.25
	2	13.96	15.20	15.79	25.02
	Cum.	99.52	98.70	96.86	97.27
<i>GER</i>	1	82.39	81.71	72.75	67.52
	2	16.76	17.21	20.61	29.26
	Cum.	99.15	98.92	93.36	96.78
<i>U.S.</i>	1	85.74	84.56	82.58	72.60
	2	13.81	15.01	14.57	24.86
	Cum.	99.55	99.57	97.15	97.46
<i>JAP</i>	1	89.78	74.10	76.69	67.16
	2	9.37	23.80	17.29	29.89
	Cum.	99.15	97.90	93.98	97.05
<i>GER</i>	1	71.71	82.85	71.98	67.79
	2	26.93	16.85	21.12	28.91
	Cum.	98.64	99.70	93.10	96.70
<i>U.K.</i>	1	80.24	81.81	75.22	77.21
	2	18.69	15.75	21.79	21.26
	Cum.	98.93	97.56	97.01	98.47
<i>GER</i>	1	68.55	84.34	73.46	67.81
	2	29.93	15.35	20.03	28.95
	Cum.	98.48	99.69	93.49	96.76
<i>JAP</i>	1	83.42	79.45	71.46	67.13
	2	15.19	19.56	21.27	29.92
	Cum.	98.61	99.01	92.73	97.05
<i>U.K.</i>	1	73.52	81.93	77.73	77.21
	2	25.02	17.63	19.56	21.25
	Cum.	98.54	99.56	97.29	98.46
<i>JAP</i>	1	76.50	77.61	74.91	67.26
	2	21.63	20.83	18.66	29.75
	Cum.	98.13	98.44	93.57	97.01

Table 19: For any given pair of countries we report the percent variance explained by principal components analysis of the residuals obtained from regressing each country's yields on the first one and on the first two common $PC^{(c)}s$. When yield levels are considered, the results are reported in the third and fourth columns, respectively, while when yield differences are analyzed these results are provided in the fifth and sixth columns. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

The 3-Country Case.

1st and 2nd Steps : Regressing PC s on $PC^{(c)}$ s and Associated R^2 (Yield levels).

Table 20: For any given set of three countries, we report results from regressing the single-country yield curve principal components (PC s) on the first eleven common $PC^{(c)}$ s extracted by pooling the term structure data of the three countries. In both Panel A and B, the first column represents the dependent variable in the regression, naming one of the first three principal components of a country. The next columns in Panel A report the regression coefficients associated with a regression using all of the first eleven $PC^{(c)}$ s, while the columns of Panel B report the R^2 when the dependent variable is regressed upon subsets of the first eleven $PC^{(c)}$ s. We use weekly yield levels observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th
<i>US</i> 1 st	0.5707	0.6482	-0.4133	0.1974	-0.2070	0.0196	0.0145	0.0284	0.0053	0.0041	0.0008
<i>US</i> 2 nd	-0.0190	0.1742	-0.3202	-0.3614	0.8061	0.2876	-0.0287	-0.0439	-0.0254	-0.0031	0.0058
<i>US</i> 3 rd	0.0013	-0.0066	0.0276	-0.0378	0.0206	0.1099	0.2050	0.6206	0.7438	0.0450	-0.0293
<i>UK</i> 1 st	0.5969	0.0614	0.7094	-0.3393	0.0951	0.0860	-0.0441	-0.0558	-0.0003	-0.0074	0.0033
<i>UK</i> 2 nd	-0.0012	0.0760	-0.1554	-0.5527	-0.0383	-0.7794	0.2334	0.0044	0.0274	-0.0117	-0.0110
<i>UK</i> 3 rd	0.0015	0.0012	-0.0448	0.0331	0.0208	-0.1457	-0.4954	-0.5685	0.6309	0.0888	-0.0038
<i>GER</i> 1 st	0.5634	-0.7201	-0.3521	0.1276	0.1200	-0.0882	0.0310	0.0258	-0.0087	0.0032	-0.0046
<i>GER</i> 2 nd	0.0168	0.1446	0.2688	0.6238	0.5287	-0.4650	0.1411	0.0381	0.0072	-0.0065	0.0086
<i>GER</i> 3 rd	-0.0021	-0.0195	0.0116	0.0420	-0.0416	0.2104	0.7954	-0.5299	0.1943	0.0064	-0.0130
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11
<i>US</i> 1 st	0.8889	0.9874	0.9978	0.9995	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>US</i> 2 nd	0.0355	0.2913	0.5164	0.7163	0.9871	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000
<i>US</i> 3 rd	0.0066	0.0211	0.0870	0.1734	0.1804	0.2543	0.3300	0.7197	0.9998	0.9999	0.9999
<i>UK</i> 1 st	0.9637	0.9646	0.9950	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 2 nd	0.0002	0.0733	0.1529	0.8543	0.8552	0.9963	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 3 rd	0.0061	0.0065	0.1349	0.1838	0.1890	0.2846	0.6103	0.8512	0.9996	1.0000	1.0000
<i>GER</i> 1 st	0.8695	0.9915	0.9991	0.9998	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0251	0.1840	0.3271	0.8639	0.9690	0.9991	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0082	0.0717	0.0775	0.1306	0.1448	0.2798	0.8487	0.9905	1.0000	1.0000	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th
<i>US</i> 1 st	0.5638	0.7107	0.3851	-0.0118	-0.1660	0.0150	0.0089	0.0264	0.0068	0.0069	-0.0024
<i>US</i> 2 nd	-0.0202	0.2259	-0.0868	-0.5707	0.7368	0.2339	-0.0162	-0.1302	-0.0182	0.0036	0.0122
<i>US</i> 3 rd	0.0020	-0.0183	-0.0231	-0.0409	0.0161	0.1809	0.3453	0.4289	0.8069	0.0722	0.0622
<i>UK</i> 1 st	0.5943	-0.0369	-0.7501	0.2514	0.1080	0.0807	-0.0339	0.0043	-0.0186	-0.0002	-0.0051
<i>UK</i> 2 nd	-0.0021	0.1077	-0.3205	-0.5764	-0.2916	-0.6641	0.1470	0.0594	0.0280	-0.0323	-0.0137
<i>UK</i> 3 rd	0.0000	0.0246	0.0063	0.0452	0.0152	-0.2117	-0.6624	-0.4388	0.5537	0.0465	0.1082
<i>JAP</i> 1 st	0.5732	-0.6530	0.3933	-0.2755	0.0708	-0.0872	0.0219	-0.0355	0.0087	-0.0062	0.0081
<i>JAP</i> 2 nd	-0.0057	-0.0599	-0.1518	-0.4426	-0.5619	0.6354	-0.2277	-0.0655	-0.0309	0.0243	0.0165
<i>JAP</i> 3 rd	-0.0010	-0.0057	0.0228	-0.0553	0.1074	-0.0820	-0.6034	0.7708	-0.1368	0.0181	-0.0266
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11
<i>US</i> 1 st	0.8869	0.9941	0.9997	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>US</i> 2 nd	0.0408	0.4301	0.4404	0.7888	0.9936	0.9997	0.9997	1.0000	1.0000	1.0000	1.0000
<i>US</i> 3 rd	0.0153	0.1165	0.1451	0.2157	0.2195	0.3636	0.5249	0.6427	0.9994	0.9998	1.0000
<i>UK</i> 1 st	0.9766	0.9769	0.9980	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 2 nd	0.0007	0.1334	0.3436	0.8769	0.9250	0.9988	0.9999	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 3 rd	0.0000	0.1345	0.1361	0.1998	0.2023	0.3477	0.7848	0.8757	0.9994	0.9995	1.0000
<i>JAP</i> 1 st	0.9028	0.9919	0.9977	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0074	0.0700	0.1418	0.6206	0.8929	0.9957	0.9998	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0034	0.0111	0.0334	0.1363	0.2733	0.2968	0.6888	0.9918	0.9999	1.0000	1.0000

Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th
<i>US</i> 1 st	0.5582	0.8048	0.0585	0.0393	-0.1799	-0.0456	-0.0042	0.0092	-0.0338	0.0055	0.0023
<i>US</i> 2 nd	-0.0250	0.1800	0.0951	0.5098	0.8085	0.1448	0.0988	-0.0076	0.1150	-0.0158	-0.0023
<i>US</i> 3 rd	0.0018	-0.0116	-0.0250	0.0298	0.0310	0.0799	0.3216	-0.6016	-0.7183	0.0564	0.0781
<i>GER</i> 1 st	0.5807	-0.4365	0.6763	-0.0300	0.0299	0.1106	0.0199	-0.0124	0.0160	-0.0039	-0.0035
<i>GER</i> 2 nd	0.0119	0.1435	-0.0492	-0.7767	0.3645	0.4829	0.0675	0.0398	0.0338	-0.0046	0.0047
<i>GER</i> 3 rd	-0.0016	-0.0174	0.0090	-0.0457	-0.0187	-0.2063	0.8340	0.5019	-0.0761	-0.0359	-0.0047
<i>JAP</i> 1 st	0.5919	-0.3264	-0.7151	0.0338	0.1623	-0.0595	-0.0096	0.0072	0.0230	-0.0026	0.0011
<i>JAP</i> 2 nd	-0.0075	-0.0389	-0.1233	0.3586	-0.3712	0.8231	0.1336	0.1405	0.0370	-0.0187	0.0088
<i>JAP</i> 3 rd	0.0002	-0.0124	0.0221	0.0403	0.1205	0.0340	-0.4085	0.6023	-0.6699	0.0497	0.0303
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11
<i>US</i> 1 st	0.8313	0.9992	0.9996	0.9996	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>US</i> 2 nd	0.0600	0.3621	0.3954	0.7379	0.9951	0.9994	0.9998	0.9998	1.0000	1.0000	1.0000
<i>US</i> 3 rd	0.0116	0.0615	0.1526	0.1988	0.2138	0.2648	0.4494	0.6947	0.9993	0.9996	1.0000
<i>GER</i> 1 st	0.9032	0.9527	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0122	0.1853	0.1933	0.9101	0.9573	0.9998	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0050	0.0609	0.0667	0.1210	0.1237	0.2934	0.9131	0.9982	0.9999	1.0000	1.0000
<i>JAP</i> 1 st	0.9207	0.9479	0.9997	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0124	0.0447	0.1730	0.5604	0.6844	0.9973	0.9992	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0001	0.0450	0.1017	0.1690	0.3487	0.3560	0.5933	0.7889	0.9998	0.9999	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th
<i>UK</i> 1 st	0.5795	-0.5083	0.5684	0.1576	0.1050	-0.1879	-0.0889	0.0576	0.0024	0.0061	-0.0149
<i>UK</i> 2 nd	-0.0067	-0.0406	0.1131	0.6060	-0.0940	0.6742	0.3737	-0.1054	-0.0517	-0.0242	0.0279
<i>UK</i> 3 rd	-0.0001	0.0282	0.0474	-0.0145	0.0490	0.1651	-0.4991	-0.4522	-0.7019	0.0969	0.1042
<i>GER</i> 1 st	0.5686	0.7918	0.1743	-0.0354	-0.1242	0.0158	0.0391	-0.0154	0.0216	-0.0057	0.0059
<i>GER</i> 2 nd	0.0088	-0.1922	0.2550	-0.6716	-0.5248	0.3382	0.2249	-0.0504	-0.0602	-0.0066	0.0139
<i>GER</i> 3 rd	-0.0011	0.0203	-0.0114	-0.0486	0.1845	-0.3459	0.6898	0.0724	-0.6006	-0.0087	0.0301
<i>JAP</i> 1 st	0.5837	-0.2647	-0.7379	-0.1017	0.0172	0.1697	0.0519	-0.0427	-0.0254	-0.0008	0.0088
<i>JAP</i> 2 nd	-0.0050	-0.0590	-0.1466	0.3775	-0.8070	-0.3999	-0.0689	0.0081	-0.1250	0.0146	-0.0064
<i>JAP</i> 3 rd	0.0001	0.0333	-0.0156	0.0112	-0.0321	0.2424	-0.2503	0.8704	-0.3361	0.0185	-0.0682
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11
<i>UK</i> 1 st	0.9427	0.9746	0.9988	0.9998	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 2 nd	0.0069	0.0179	0.0701	0.9153	0.9179	0.9902	0.9996	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 3 rd	0.0000	0.1032	0.2810	0.2904	0.3038	0.3880	0.7117	0.8330	0.9990	0.9995	1.0000
<i>GER</i> 1 st	0.9192	0.9976	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0071	0.1561	0.3154	0.9392	0.9869	0.9979	0.9999	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0025	0.0389	0.0458	0.1173	0.2463	0.4965	0.9155	0.9176	1.0000	1.0000	1.0000
<i>JAP</i> 1 st	0.9504	0.9590	0.9995	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0057	0.0413	0.1748	0.6743	0.9603	0.9991	0.9996	0.9996	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0000	0.1558	0.1767	0.1828	0.1890	0.3850	0.4731	0.9586	0.9998	0.9998	1.0000

1st and 2nd Steps: Regressing PCs on PC^(c)s and Associated R² (Yield differences).

Table 21: For any given set of three countries, we report results from regressing the single-country yield curve principal components (PCs) on the first eleven common PC^(c)s extracted by pooling the term structure yield data of the three countries. In both Panel A and B, the first column represents the dependent variable in the regression, naming one of the first three principal components of a country. The next columns in Panel A report the regression coefficients associated with a regression using all of the first eleven PC^(c)s, while the columns of Panel B report the R² when the dependent variable is regressed upon subsets of the first eleven PC^(c)s. We use weekly yield differences observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th
US 1 st	0.5990	-0.6354	-0.4802	0.0747	-0.0154	0.0305	0.0081	0.0006	-0.0029	0.0031	0.0010
US 2 nd	0.0043	0.0037	0.0048	-0.3507	0.0507	0.9320	0.0711	-0.0132	-0.0188	-0.0093	0.0036
US 3 rd	0.0005	0.0026	-0.0027	-0.0299	0.0054	-0.0400	0.1401	0.1735	-0.9681	-0.0999	0.0003
UK 1 st	0.5667	0.7625	-0.3093	-0.0367	0.0118	-0.0185	-0.0003	-0.0045	0.0044	0.0000	-0.0026
UK 2 nd	0.0249	-0.0708	-0.0113	-0.6114	0.7389	-0.2701	0.0116	-0.0086	0.0328	0.0146	-0.0092
UK 3 rd	-0.0028	0.0040	-0.0070	-0.0032	0.0017	0.0067	0.1236	0.9725	0.1946	-0.0256	0.0157
GER 1 st	0.5651	-0.0871	0.8202	-0.0015	-0.0179	-0.0057	-0.0036	0.0085	-0.0008	-0.0020	0.0018
GER 2 nd	0.0090	-0.0475	-0.0288	-0.7037	-0.6704	-0.2252	-0.0315	-0.0001	0.0226	-0.0001	-0.0006
GER 3 rd	-0.0028	0.0033	0.0070	0.0141	-0.0349	-0.0671	0.9791	-0.1468	0.1161	0.0144	0.0050
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11
US 1 st	0.6449	0.8765	0.9992	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
US 2 nd	0.0006	0.0007	0.0009	0.2729	0.2761	0.9974	0.9999	0.9999	1.0000	1.0000	1.0000
US 3 rd	0.0000	0.0005	0.0009	0.0130	0.0132	0.0214	0.0819	0.1186	0.9955	0.9999	0.9999
UK 1 st	0.6001	0.9468	0.9998	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
UK 2 nd	0.0118	0.0423	0.0431	0.5517	0.9626	0.9998	0.9999	0.9999	1.0000	1.0000	1.0000
UK 3 rd	0.0012	0.0020	0.0043	0.0044	0.0044	0.0046	0.0424	0.9712	0.9997	1.0000	1.0000
GER 1 st	0.6129	0.6175	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
GER 2 nd	0.0015	0.0145	0.0189	0.6556	0.9752	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000
GER 3 rd	0.0005	0.0007	0.0016	0.0025	0.0055	0.0131	0.9871	0.9958	1.0000	1.0000	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th
US 1 st	0.6716	-0.2720	-0.6857	0.0249	-0.0552	0.0292	0.0064	0.0040	-0.0031	-0.0040	0.0012
US 2 nd	0.0053	0.0085	0.0060	-0.1112	0.3862	0.9149	0.0261	-0.0052	-0.0178	0.0118	0.0027
US 3 rd	0.0026	0.0064	0.0025	-0.0066	0.0273	-0.0301	0.0428	0.2748	-0.9588	-0.0327	0.0015
UK 1 st	0.6405	-0.2528	0.7241	-0.0052	0.0283	-0.0181	-0.0184	-0.0012	0.0021	0.0028	-0.0021
UK 2 nd	0.0281	0.0046	-0.0695	-0.1580	0.8996	-0.3981	0.0066	-0.0107	0.0364	0.0012	-0.0093
UK 3 rd	-0.0013	0.0007	0.0034	-0.0052	0.0030	0.0081	0.0379	0.9594	0.2773	-0.0270	0.0154
JAP 1 st	0.3711	0.9284	-0.0035	0.0006	-0.0181	-0.0030	0.0015	-0.0019	0.0063	0.0002	0.0008
JAP 2 nd	0.0087	-0.0067	-0.0107	-0.9808	-0.1905	-0.0388	-0.0017	-0.0047	0.0010	0.0001	0.0055
JAP 3 rd	0.0066	-0.0049	0.0177	0.0025	-0.0168	-0.0206	0.9977	-0.0481	0.0313	0.0004	-0.0032
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11
US 1 st	0.6704	0.7305	0.9996	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
US 2 nd	0.0007	0.0018	0.0021	0.0281	0.2802	0.9995	0.9999	0.9999	1.0000	1.0000	1.0000
US 3 rd	0.0010	0.0046	0.0049	0.0055	0.0133	0.0180	0.0252	0.1204	0.9994	0.9999	0.9999
UK 1 st	0.6339	0.6879	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
UK 2 nd	0.0125	0.0127	0.0420	0.0744	0.9160	0.9998	0.9999	0.9999	1.0000	1.0000	1.0000
UK 3 rd	0.0002	0.0002	0.0008	0.0011	0.0012	0.0014	0.0060	0.9404	0.9996	1.0000	1.0000
JAP 1 st	0.2261	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
JAP 2 nd	0.0009	0.0012	0.0018	0.9701	0.9994	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
JAP 3 rd	0.0017	0.0023	0.0071	0.0071	0.0079	0.0084	0.9990	0.9998	1.0000	1.0000	1.0000

Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th
<i>US</i> 1 st	0.6439	-0.4715	0.6010	0.0233	-0.0301	0.0177	-0.0035	-0.0096	-0.0002	-0.0056	-0.0024
<i>US</i> 2 nd	0.0052	0.0087	-0.0041	-0.1719	0.3238	0.9249	0.0495	-0.0861	-0.0064	0.0129	0.0042
<i>US</i> 3 rd	0.0014	0.0070	0.0042	-0.0125	0.0206	-0.0309	0.0330	-0.1359	-0.9840	-0.0272	0.0995
<i>GER</i> 1 st	0.6378	-0.1029	-0.7628	0.0076	0.0218	-0.0127	0.0074	0.0003	-0.0022	0.0061	0.0009
<i>GER</i> 2 nd	0.0120	-0.0224	0.0383	-0.4176	0.8300	-0.3634	-0.0318	0.0276	0.0288	0.0004	-0.0037
<i>GER</i> 3 rd	0.0002	0.0144	-0.0025	-0.0298	-0.0257	-0.0847	-0.0555	-0.9844	0.1346	0.0218	-0.0148
<i>JAP</i> 1 st	0.4222	0.8753	0.2350	-0.0065	-0.0012	-0.0089	-0.0017	0.0142	0.0060	-0.0010	-0.0015
<i>JAP</i> 2 nd	0.0126	-0.0113	-0.0096	-0.8912	-0.4514	-0.0042	0.0022	0.0384	-0.0026	-0.0001	0.0074
<i>JAP</i> 3 rd	-0.0017	0.0000	0.0094	-0.0040	0.0091	-0.0612	0.9961	-0.0452	0.0421	0.0040	0.0042
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11
<i>US</i> 1 st	0.6370	0.8118	0.9998	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>US</i> 2 nd	0.0007	0.0018	0.0019	0.0662	0.2489	0.9948	0.9963	1.0000	1.0000	1.0000	1.0000
<i>US</i> 3 rd	0.0003	0.0044	0.0053	0.0074	0.0119	0.0171	0.0213	0.0771	0.9952	0.9956	1.0000
<i>GER</i> 1 st	0.6676	0.6765	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0022	0.0062	0.0138	0.2345	0.9324	0.9993	0.9997	0.9999	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0000	0.0057	0.0058	0.0097	0.0120	0.0247	0.0287	0.9942	0.9999	1.0000	1.0000
<i>JAP</i> 1 st	0.3026	0.9682	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0020	0.0028	0.0032	0.8299	0.9996	0.9996	0.9997	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0001	0.0001	0.0014	0.0014	0.0016	0.0067	0.9980	0.9996	1.0000	1.0000	1.0000
Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th
<i>UK</i> 1 st	0.6211	-0.4884	0.6122	-0.0141	0.0098	-0.0094	-0.0217	-0.0032	0.0031	-0.0001	-0.0005
<i>UK</i> 2 nd	0.0162	0.0179	-0.0310	-0.4434	0.5071	-0.7363	0.0281	-0.0391	0.0058	-0.0018	-0.0112
<i>UK</i> 3 rd	-0.0027	0.0007	0.0087	-0.0046	-0.0039	-0.0011	0.0294	-0.1207	-0.9911	-0.0254	0.0374
<i>GER</i> 1 st	0.6460	-0.1233	-0.7521	0.0325	-0.0027	0.0221	0.0149	-0.0027	-0.0079	0.0036	0.0003
<i>GER</i> 2 nd	-0.0022	0.0001	-0.0092	-0.5705	0.4749	0.6693	-0.0296	0.0100	-0.0020	0.0012	0.0017
<i>GER</i> 3 rd	0.0018	0.0124	0.0014	-0.0136	-0.0421	0.0311	-0.0516	-0.9898	0.1183	0.0210	-0.0072
<i>JAP</i> 1 st	0.4433	0.8635	0.2396	0.0008	-0.0104	0.0124	-0.0004	0.0128	0.0000	-0.0014	-0.0007
<i>JAP</i> 2 nd	0.0096	-0.0067	-0.0204	-0.6902	-0.7178	-0.0798	0.0027	0.0374	0.0017	0.0003	0.0070
<i>JAP</i> 3 rd	0.0036	-0.0084	0.0251	-0.0040	0.0000	0.0420	0.9969	-0.0463	0.0355	0.0024	0.0072
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11
<i>UK</i> 1 st	0.5998	0.7930	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 2 nd	0.0042	0.0068	0.0122	0.2854	0.5927	0.9992	0.9995	1.0000	1.0000	1.0000	1.0000
<i>UK</i> 3 rd	0.0009	0.0010	0.0044	0.0046	0.0048	0.0048	0.0075	0.0429	0.9992	0.9995	1.0000
<i>GER</i> 1 st	0.6664	0.6791	0.9998	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0001	0.0001	0.0005	0.4277	0.6823	0.9996	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0002	0.0044	0.0044	0.0053	0.0122	0.0146	0.0181	0.9943	0.9999	1.0000	1.0000
<i>JAP</i> 1 st	0.3246	0.9663	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0011	0.0014	0.0032	0.5175	0.9960	0.9997	0.9997	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0005	0.0020	0.0110	0.0111	0.0111	0.0144	0.9980	0.9996	1.0000	1.0000	1.0000

3rd Step : Extracting $PC^{(\ell)}$ s from $PC^{(c)}$ s-based Yield Curve Residuals

Countries	$PC^{(\ell)}s$	Yield levels			Yield differences		
		after 1 $PC^{(c)}$	after 2 $PC^{(c)}s$	after 3 $PC^{(c)}s$	after 1 $PC^{(c)}$	after 2 $PC^{(c)}s$	after 3 $PC^{(c)}s$
U.S.	1	86.31	55.18	83.03	85.26	71.07	71.11
	2	13.23	43.28	15.18	12.32	24.09	25.44
	Cum.	99.54	98.46	98.21	97.58	95.16	96.55
U.K.	1	73.88	74.58	66.92	80.81	53.17	76.92
	2	24.80	24.06	26.68	16.86	40.30	21.52
	Cum.	98.68	98.64	95.60	97.67	93.47	98.44
GER	1	84.70	58.13	82.05	76.14	76.15	67.51
	2	14.56	38.70	17.70	17.99	17.94	29.25
	Cum.	99.26	96.83	99.75	94.13	94.09	96.76
U.S.	1	87.07	63.56	82.74	84.39	82.04	71.76
	2	12.53	34.19	15.86	13.05	15.01	25.18
	Cum.	99.60	97.75	98.60	97.44	97.05	96.94
U.K.	1	66.31	69.27	80.56	79.62	77.34	76.93
	2	31.72	28.87	18.52	17.91	19.93	21.54
	Cum.	98.03	98.14	99.08	97.53	97.27	98.47
JAP	1	89.77	53.96	64.32	81.48	67.18	67.25
	2	9.40	42.35	31.73	13.73	29.85	29.77
	Cum.	99.17	96.31	96.05	95.21	97.03	97.02
U.S.	1	90.93	77.38	81.45	85.50	77.41	72.24
	2	8.75	20.93	16.96	12.12	18.83	25.01
	Cum.	99.68	98.31	98.41	97.62	96.24	97.25
GER	1	80.03	69.98	83.38	73.74	73.44	67.57
	2	19.03	28.41	16.27	19.84	20.09	29.19
	Cum.	99.06	98.39	99.65	93.58	93.53	96.76
JAP	1	88.79	84.67	75.18	80.23	55.29	67.13
	2	10.18	14.00	23.13	14.65	31.92	29.92
	Cum.	98.97	98.67	98.31	94.88	87.21	97.05
U.K.	1	81.24	68.27	78.46	80.55	70.66	77.16
	2	17.65	30.31	18.93	17.08	25.78	21.29
	Cum.	98.89	98.58	97.39	97.63	96.44	98.45
GER	1	76.89	75.85	81.99	73.48	72.94	67.81
	2	22.01	21.78	17.59	19.98	20.41	28.85
	Cum.	98.90	97.63	99.58	93.46	93.35	96.66
JAP	1	83.13	80.49	78.96	79.65	54.82	67.25
	2	15.35	18.06	19.32	15.10	31.63	29.78
	Cum.	98.48	98.55	98.28	94.75	86.45	97.03

Table 22: For any given set of three countries we report the percent variance explained in the residuals obtained from regressing each country's yields on the first one to the first three common $PC^{(c)}$ s. When yield levels are considered, the results are reported in the third to fifth columns while, when yield differences are analyzed, these results are provided in the sixth to eighth columns. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

The 4-country Case.

1st and 2nd Steps: Regressing PC's on PC^(c)'s and Associated R² (Yield levels).

Table 23: In the case of four countries, we report results from regressing the single-country yield curve principal components (*PC*'s) on the first sixteen common *PC*^(c)'s extracted by pooling the term structure data of all four countries. In both Panel *A* and *B*, the first column represents the dependent variable in the regression, naming one of the first three yield curve principal components of a country. The next columns in Panel *A* report the regression coefficients associated with a regression using all of the first sixteen *PC*^(c)'s, while the columns of Panel *B* report the *R*² when the dependent variable is regressed upon subsets of the first sixteen *PC*^(c)'s. We use weekly yield levels observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

Panel <i>A</i>	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th	12 th	13 th	14 th	15 th	16 th
<i>U.S.</i> 1 st	0.4821	0.7411	0.1781	0.0139	0.3885	0.1822	0.0011	0.0364	0.0019	-0.0130	-0.0260	-0.0022	-0.0071	-0.0004	-0.0035	0.0048
<i>U.S.</i> 2 nd	-0.0208	0.1800	0.1097	0.3988	0.0167	-0.8590	-0.1072	0.1615	-0.0205	0.0476	0.1310	-0.0072	-0.0006	0.0066	0.0083	-0.0174
<i>U.S.</i> 3 rd	0.0016	-0.0105	-0.0259	0.0263	-0.0174	-0.0380	-0.0471	0.2123	0.1683	-0.8480	-0.2390	0.3664	-0.0937	-0.0225	-0.0040	-0.0305
<i>U.K.</i> 1 st	0.5183	0.1347	-0.2222	-0.0340	-0.7860	-0.0454	0.1484	0.0967	-0.0970	0.0248	-0.0320	-0.0096	0.0015	-0.0156	0.0054	0.0049
<i>U.K.</i> 2 nd	-0.0034	0.0828	0.0487	0.5195	-0.2002	0.1440	-0.1624	-0.6717	0.4150	-0.0384	0.0122	0.0818	0.0354	0.0216	-0.0086	0.0078
<i>U.K.</i> 3 rd	0.0004	0.0102	0.0498	-0.0216	0.0023	0.0178	0.0376	-0.2269	-0.4822	0.0709	0.3668	0.7386	-0.1226	0.0879	-0.0295	-0.0481
<i>GER</i> 1 st	0.4918	-0.4908	0.7044	-0.0333	0.0142	-0.0202	-0.1291	0.0086	0.0391	-0.0117	0.0218	-0.0170	0.0051	0.0065	-0.0025	-0.0072
<i>GER</i> 2 nd	0.0122	0.1389	-0.0668	-0.6633	-0.0777	-0.2556	-0.5871	-0.2371	0.2340	0.0222	0.0623	0.0660	0.0086	0.0162	0.0058	-0.0021
<i>GER</i> 3 rd	-0.0016	-0.0178	0.0067	-0.0458	0.0075	0.0140	0.2280	0.3455	0.6497	0.4127	-0.0176	0.4808	0.0045	0.0342	-0.0038	-0.0260
<i>JAP</i> 1 st	0.5064	-0.3625	-0.6211	0.0936	0.4212	-0.1316	-0.0265	-0.1284	0.0564	0.0054	0.0410	0.0276	0.0005	0.0098	0.0005	-0.0040
<i>JAP</i> 2 nd	-0.0059	-0.0312	-0.1191	0.3400	-0.0744	0.3273	-0.7170	0.4470	-0.1109	0.1480	0.0533	0.0668	-0.0184	-0.0022	-0.0031	-0.0271
<i>JAP</i> 3 rd	-0.0003	-0.0133	0.0252	0.0300	0.0339	-0.1170	-0.0901	-0.1461	-0.2406	0.2702	-0.8746	0.2219	-0.0231	-0.0661	0.0333	0.0533
Panel <i>B</i>	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11	First 12	First 13	First 14	First 15	First 16
<i>U.S.</i> 1 st	0.8441	0.9905	0.9939	0.9939	0.9996	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>U.S.</i> 2 nd	0.0565	0.3669	0.4138	0.6964	0.6968	0.9955	0.9977	0.9997	0.9997	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>U.S.</i> 3 rd	0.0139	0.0560	0.1594	0.2078	0.2240	0.2471	0.2634	0.4006	0.4517	0.9098	0.9435	0.9993	0.9999	1.0000	1.0000	1.0000
<i>U.K.</i> 1 st	0.9666	0.9714	0.9767	0.9768	0.9998	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>U.K.</i> 2 nd	0.0023	0.1009	0.1148	0.8344	0.9159	0.9285	0.9359	0.9881	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>U.K.</i> 3 rd	0.0008	0.0299	0.3110	0.3350	0.3352	0.3390	0.3466	0.4621	0.7710	0.7733	0.8317	0.9988	0.9996	0.9999	0.9999	1.0000
<i>GER</i> 1 st	0.8814	0.9459	0.9998	0.9999	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 2 nd	0.0175	0.1843	0.1999	0.9047	0.9121	0.9360	0.9937	0.9976	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>GER</i> 3 rd	0.0063	0.0661	0.0695	0.1429	0.1444	0.1460	0.3365	0.5180	0.8978	0.9519	0.9520	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 1 st	0.9171	0.9516	0.9928	0.9932	0.9998	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 2 nd	0.0105	0.0319	0.1582	0.6277	0.6449	0.7440	0.9625	0.9977	0.9990	0.9998	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
<i>JAP</i> 3 rd	0.0003	0.0538	0.1318	0.1821	0.2310	0.4053	0.4527	0.5045	0.5875	0.6246	0.9833	0.9996	0.9997	0.9999	0.9999	1.0000

1st and 2nd Steps: Regressing PCs on $PC^{(c)}$ s and Associated R^2 (Yield differences).

Table 24: In the case of four countries, we report results from regressing the single-country yield curve principal components (PCs) on the first sixteen common $PC^{(c)}$ s extracted by pooling the term structure data of all four countries. In both Panel A and B , the first column represents the dependent variable in the regression, naming one of the first three yield curve principal components of a country. The next columns in Panel A report the regression coefficients associated with a regression using all of the first sixteen $PC^{(c)}$ s, while the columns of Panel B report the R^2 when the dependent variable is regressed upon subsets of the first sixteen $PC^{(c)}$ s. We use weekly yield differences observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

Panel A	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th	11 th	12 th	13 th	14 th	15 th	16 th
U.S. 1 st	0.5608	-0.2894	-0.6495	-0.4158	-0.0656	0.0366	-0.0146	0.0306	0.0030	-0.0091	-0.0003	0.0029	0.0058	0.0021	0.0009	-0.0073
U.S. 2 nd	0.0053	0.0081	0.0039	0.0014	0.2912	-0.1930	0.0487	0.9306	0.0501	-0.0774	0.0135	0.0191	-0.0136	-0.0071	0.0033	-0.0106
U.S. 3 rd	0.0015	0.0062	0.0027	-0.0056	0.0247	-0.0159	0.0032	-0.0424	0.0336	-0.1392	-0.1589	0.9692	0.0261	-0.1052	0.0009	0.0198
U.K. 1 st	0.5312	-0.2684	0.7517	-0.2797	0.0336	-0.0174	0.0133	-0.0170	-0.0231	0.0004	0.0035	-0.0033	-0.0015	0.0002	-0.0025	0.0015
U.K. 2 nd	0.0252	0.0035	-0.0709	-0.0134	0.4710	-0.4086	0.7280	-0.2712	0.0140	-0.0137	0.0086	-0.0325	0.0009	0.0144	-0.0093	0.0056
U.K. 3 rd	-0.0026	0.0006	0.0039	-0.0077	0.0055	0.0034	0.0016	0.0047	0.0313	-0.1249	-0.9738	-0.1823	0.0249	-0.0285	0.0156	-0.0049
GER 1 st	0.5502	0.0272	-0.0692	0.8311	-0.0074	-0.0159	-0.0168	-0.0053	0.0143	-0.0007	-0.0083	0.0017	-0.0053	-0.0014	0.0017	0.0028
GER 2 nd	0.0076	-0.0129	-0.0485	-0.0245	0.5968	-0.3619	-0.6766	-0.2209	-0.0416	0.0300	-0.0011	-0.0228	-0.0008	0.0009	-0.0010	-0.0026
GER 3 rd	-0.0008	0.0139	0.0037	0.0018	0.0078	0.0438	-0.0309	-0.0703	-0.0498	-0.9770	0.1439	-0.1150	-0.0237	0.0184	0.0042	0.0032
JAP 1 st	0.3158	0.9181	0.0166	-0.2378	-0.0027	0.0105	-0.0122	-0.0045	-0.0010	0.0144	0.0007	-0.0054	0.0011	0.0013	0.0005	0.0020
JAP 2 nd	0.0103	-0.0067	-0.0127	0.0146	0.5753	0.8127	0.0790	-0.0126	0.0016	0.0389	0.0008	0.0029	-0.0001	-0.0072	0.0054	-0.0030
JAP 3 rd	0.0027	-0.0054	0.0190	-0.0180	0.0032	0.0013	-0.0423	-0.0548	0.9949	-0.0349	0.0429	-0.0355	-0.0033	-0.0036	-0.0027	0.0148
Panel B	Only 1 st	First 2	First 3	First 4	First 5	First 6	First 7	First 8	First 9	First 10	First 11	First 12	First 13	First 14	First 15	First 16
U.S. 1 st	0.6001	0.6683	0.9103	0.9992	0.9998	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
U.S. 2 nd	0.0009	0.0019	0.0020	0.0020	0.1995	0.2731	0.2759	0.9953	0.9969	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
U.S. 3 rd	0.0004	0.0038	0.0042	0.0060	0.0147	0.0178	0.0178	0.0270	0.0314	0.0905	0.1212	0.9947	0.9951	0.9999	0.9999	1.0000
U.K. 1 st	0.5598	0.6208	0.9579	0.9998	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
U.K. 2 nd	0.0129	0.0130	0.0436	0.0446	0.3625	0.5654	0.9622	0.9997	0.9998	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000
U.K. 3 rd	0.0011	0.0011	0.0019	0.0045	0.0048	0.0049	0.0049	0.0050	0.0081	0.0463	0.9745	0.9994	0.9997	1.0000	1.0000	1.0000
GER 1 st	0.6170	0.6176	0.6205	0.9999	0.9999	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
GER 2 nd	0.0011	0.0025	0.0160	0.0191	0.5013	0.6517	0.9755	0.9991	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
GER 3 rd	0.0000	0.0056	0.0059	0.0059	0.0062	0.0139	0.0162	0.0246	0.0278	0.9875	0.9958	0.9998	0.9999	1.0000	1.0000	1.0000
JAP 1 st	0.2103	0.9677	0.9678	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
JAP 2 nd	0.0017	0.0020	0.0027	0.0036	0.3722	0.9959	0.9996	0.9996	0.9996	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
JAP 3 rd	0.0004	0.0010	0.0066	0.0111	0.0111	0.0111	0.0145	0.0184	0.9982	0.9991	0.9997	1.0000	1.0000	1.0000	1.0000	1.0000

3rd Step : Extracting $PC^{(\ell)}s$ from $PC^{(c)}s$ -Based Yield Curve Residuals

Countries	$PC^{(\ell)}s$	Yield levels				Yield differences			
		after 1 $PC^{(c)}$	after 2 $PC^{(c)}s$	after 3 $PC^{(c)}s$	after 4 $PC^{(c)}s$	after 1 $PC^{(c)}$	after 2 $PC^{(c)}s$	after 3 $PC^{(c)}s$	after 4 $PC^{(c)}s$
U.S.	1	90.35	56.68	61.62	61.16	86.50	84.54	65.95	71.10
	2	9.32	41.55	36.29	35.69	11.29	12.92	28.34	25.42
	Cum.	99.67	98.23	97.91	96.85	97.79	97.46	94.29	96.52
U.K.	1	72.80	71.91	69.34	91.26	82.05	80.10	54.39	76.87
	2	25.64	26.39	29.20	6.70	15.76	17.49	38.72	21.56
	Cum.	98.44	98.30	98.54	97.96	97.81	97.59	93.11	98.43
GER	1	83.05	72.31	83.41	66.08	75.88	75.86	75.93	67.54
	2	16.14	26.22	16.18	31.70	18.18	18.22	18.12	29.19
	Cum.	99.19	98.53	99.59	97.78	94.06	94.08	94.05	96.73
JAP	1	88.88	83.38	54.37	64.26	81.80	55.19	55.26	67.25
	2	10.13	15.19	42.32	30.55	13.48	31.63	31.64	29.79
	Cum.	99.01	98.57	96.69	94.81	95.28	86.82	86.90	97.04

Table 25: In the case of four countries we report the percent variance explained in the residuals obtained from regressing each country's yields on the first one to the first four $PC^{(c)}s$. When yield levels are considered, the results are reported in the third to sixth columns while, when yield differences are analyzed, these results are provided in the seventh to tenth columns. We use weekly data for a sample period starting from January 1, 1986 to December 31, 2009 (1252 observations) and residual maturities from 1 to 9 years.

Appendix 3: The *DLY*-Approach.

Countries		Yield levels				Yield differences			
		$PC^{(L)}_s$		$PC^{(S)}_s$		$PC^{(L)}_s$		$PC^{(S)}_s$	
		Marg.	Cum.	Marg.	Cum.	Marg.	Cum.	Marg.	Cum.
<i>U.S.-U.K.</i>	1	96.66	96.66	79.04	79.04	73.18	73.18	62.91	62.91
	2	3.34	100.00	20.96	100.00	26.82	100.00	37.09	100.00
<i>U.S.-GER</i>	1	94.75	94.75	52.77	52.77	72.92	72.92	64.74	64.74
	2	5.25	100.00	47.23	100.00	27.08	100.00	35.26	100.00
<i>U.S.-JAP</i>	1	94.61	94.61	50.16	50.16	58.96	58.96	54.22	54.22
	2	5.39	100.00	49.84	100.00	41.04	100.00	45.78	100.00
<i>GER-U.K.</i>	1	97.18	97.18	74.24	74.24	71.02	71.02	63.36	63.36
	2	2.82	100.00	25.76	100.00	28.98	100.00	36.64	100.00
<i>GER-JAP</i>	1	95.45	95.45	74.77	74.77	62.29	62.29	54.91	54.91
	2	4.55	100.00	25.23	100.00	37.71	100.00	45.09	100.00
<i>U.K.-JAP</i>	1	97.86	97.89	77.92	77.92	58.47	58.47	52.37	52.37
	2	2.14	100.00	22.08	100.00	41.53	100.00	47.63	100.00
<i>U.S.-U.K.-GER</i>	1	94.93	94.93	59.47	59.47	63.17	63.17	51.57	51.57
	2	3.52	98.45	31.52	90.99	19.33	82.50	24.95	76.52
	3	1.55	100.00	9.01	100.00	17.50	100.00	23.48	100.00
<i>U.S.-U.K.-JAP</i>	1	95.18	95.18	60.24	60.24	52.34	52.34	42.95	42.95
	2	3.68	98.86	33.23	93.47	29.78	82.12	32.42	75.36
	3	1.14	100.00	6.53	100.00	17.88	100.00	24.64	100.00
<i>U.S.-GER-JAP</i>	1	93.25	93.25	49.96	49.96	53.59	53.59	44.78	44.78
	2	3.72	96.97	33.31	83.27	28.56	82.15	31.73	76.51
	3	3.03	100.00	16.73	100.00	17.85	100.00	23.49	100.00
<i>U.K.-GER-JAP</i>	1	95.78	95.78	67.55	67.55	52.40	52.40	43.41	43.41
	2	3.07	98.85	17.75	85.30	28.58	80.98	32.33	75.74
	3	1.15	100.00	14.70	100.00	19.02	100.00	24.26	100.00
<i>U.S.-U.K.-GER-JAP</i>	1	94.13	94.13	53.99	53.99	50.29	50.29	39.45	39.45
	2	2.82	96.95	28.54	82.52	22.36	72.65	24.35	63.80
	3	2.30	99.25	12.86	95.38	14.27	86.92	18.60	82.40
	4	0.75	100.00	4.61	100.00	13.08	100.00	17.60	100.00

Table 26: We conduct a *DLY*-based analysis of the term structure of interest rates of groups of two, three and four countries and report the marginal and cumulative percent variance explained. We extract, using regression, the level factor and the slope factor from each country's term structure, and then we perform a principal component analysis across countries on each set of extracted factors (level L and slope S). The first column lists the group of countries while the second column lists the number of extracted principal components. The rest of the table is divided into two vertical blocks: the first block represents yield levels and the second block represents yield differences. Each block shows the results of a principal component analysis, for levels in the first two columns and for slopes in the next two. For each group of countries, we use weekly yields observed from January 1, 1986 to December 31, 2009 (1252 observations) and with residual maturities from 1 to 9 years.

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