Primary Income Distribution: Labour Market's Role In Selected European and Transition Countries[1]

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Abstract

Purpose: The aim of this study is to show how the concentrations of primary income can be related to the labour market structure in two samples of selected European and transition countries. Then it focuses on the differences in the transitional path of Poland and Russia that justify the current divergences in the distribution of income in these two countries.

Methodology: This research, in its empirical part, is based on cluster analysis and principal component analysis (PCA). By these techniques, the study defines which main factors of the labour market are more involved in the distribution process in the selected countries.

Findings: On the basis of the data used, it seems possible to establish a relationship between different labour market models and the degree of primary income inequality, focusing on which variables are more relevant with respect to the different labour market systems.

Originality: This research deals with the aspect of the concentration of primary income in different economies with cluster and principal component analyses, considering the shortage of related economic data in this field of research.

Keywords: primary income distribution, labour market models, European countries, transition countries

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[1]   This work is extracted from the Master thesis discussed on March 20th, 2012 at La University of Rome (Faculty of Economics).

Rynek pracy i pierwotny rozkład dochodów w gospodarce na przykładzie wybranych gospodarek europejskich

Cel: Celem artykułu jest zbadanie wpływu struktury rynku pracy na rozkład dochodów pierwotnych w gospodarce. Do badania wybrano dwa kraje posocjalistycznej transformacji – Polskę i Rosję; wskazano różne ścieżki zmian strukturalnych w tych krajach, co tłumaczy różnice w bieżącym rozkładzie dochodów w tych dwóch gospodarkach.

Metodologia: W części empirycznej badania wykorzystano analizę klastrów oraz metodę PCA (Principal Component Analysis). Za pomocą tych technik wyodrębniono podstawowe czynniki rynku pracy, które mają decydujące znaczenie dla rozkładu dochodu w wybranych gospodarkach.

Wnioski: Na podstawie analizy danych można stwierdzić występowanie zależności między modelem rynku pracy a nierównościami w rozkładzie dochodów pierwotnych w gospodarce.

Oryginalność: Innowacyjność badania, głównie ze względu na niewielką dostępność danych, polega na wykorzystaniu analizy klastrów dla rozpoznania kluczowych czynników mających wpływ na rozkład dochodów pierwotnych w gospodarce.

Słowa kluczowe: pierwotny rozkład dochodu, modele rynku pracy, kraje europejskiej gospodarki w transformacji

JEL: D33, J40, P51

| Primary income distribution

Budgetary problems of many states raise questions about the sustainability of their activities in redistribution. Identifying major criticisms in primary distribution and acting upon them, on one hand, would contain concentrations of income, and on the other would avoid burdening government expenditures.

In Figure 1, it is possible to see the trend of the Gini coefficient on market income. Generally speaking, the Gini coefficient calculated on market income (0.47on average in the last year) is much higher than the same coefficient calculated on disposable income, considering that it is 0.30 on average in the last years (source: OECD).

Figure 1 | Dynamics of inequality on market income (measured by Gini coefficient on Y-axis)
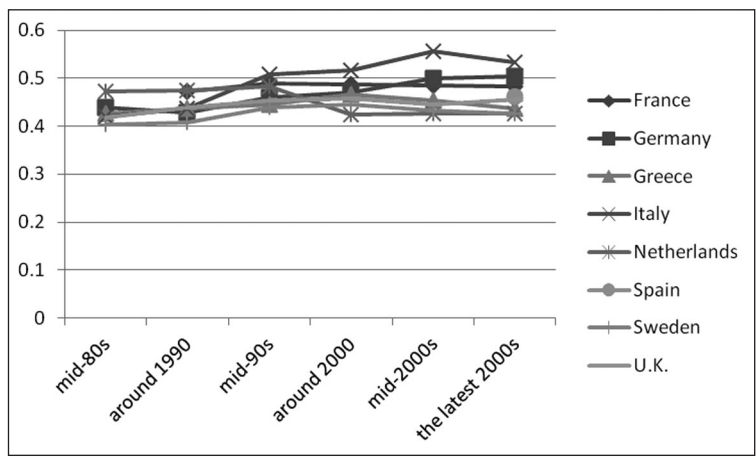
Source: elaboration on OECD data.

The dynamic is decreasing for Sweden and The Netherlands, while elsewhere it is stable (ex. France) or increasing.

Most interesting are the increases in Germany and Italy in the mid-1990s. Italy in particular, from that time onwards, is the country with major concentrations of market income. If one looks at primary income distribution, the United Kingdom's position is remarkable as it is among the middle-low income inequality countries, while if we consider secondary distribution of income, it is one of the most unequal countries. Evidently this is due to the weak redistribution of funds of the British government.

| Labour market and income concentrations in selected European countries: analysis models

Economic inequalities are complex phenomena that involve many factors, some of which are still not clearly identified or quantified in economics.

Cross-country analyses present problems that derive directly from the methodology of data collection that, for example, means treatment of missing data, different standards, sample sizes and selection, etc. The choice to analyze the role of the labour market within the dynamics of market income distribution as a whole was made for this research.

The results must take into account these methodological problems and the further multi-dimensionality of the labour market structure, which is difficult to identify exhaustively within a limi-

ted amount of variables. Consider that a cluster analysis was chosen, followed by a principal components analysis. In fact, these research techniques of data analysis are particularly suitable to analyze multidimensional phenomena like economic inequality.

Cluster Analysis

Cluster analysis is used to create groups of countries consistent with their level of inequality of market incomes.

The sample countries are France, Germany, Italy, The Netherlands, Spain, Sweden and the United Kingdom. The choice of these countries has been dictated by the availability of data and by their importance in the European context. The reference year is 2008 for all countries.

The variables that compose the dataset are: (1) share of educated workers on the total labour force ($zlabf\_ed$); (2) average GDP growth from 2004 to 2008 that also measures the trend of labour demand ($zgdpg\_m$)[2]; (3) unemployment rate (zun_m); (4) share of workers with non-standard contracts to total workers ($znonst\_em$); (5) public expenditure on education with respect to GDP (zg_ed); (6) degree of protection afforded by national law to workers ($zepl$); and (7) government expenditure on active labour market policies with relation to the GDP (zg_lmp).

The variables were appropriately standardized to make them comparable.

The source of the variables is heterogeneous, in particular the data on the labour force, GDP growth, unemployment and public spending on education come from World Development Indicators (WDI) 2011 provided by the World Bank. Data on non-standard workers came from Eurostat and the rest of the variables came from the OECD.

The following Figure 2 and Table 1 show the ranking of market income inequality for the selected countries from 2008. The Gini coefficient used is calculated by OECD on total population and on market income, i.e. the income before taxation and transfers.

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[2] It was decided to use the average GDP growth over five years to avoid biased data from positive or negative yearly shocks.

Figure 2 | Ranking of Gini coefficient on market income (2008)
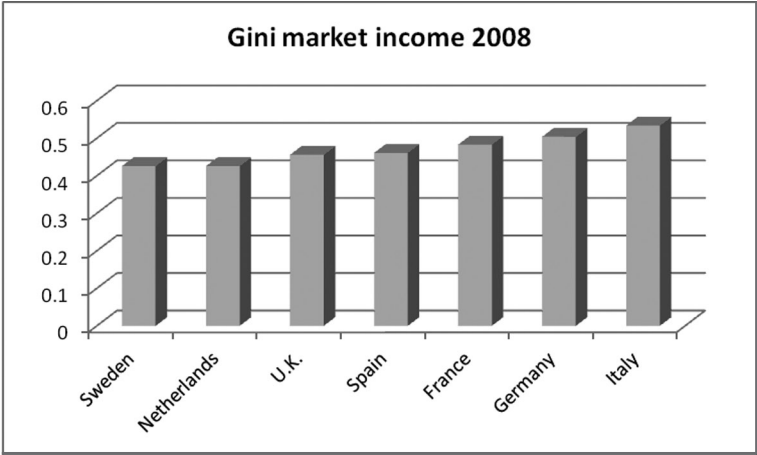
Source: elaboration on OECD data.

The values can be analyzed in Table 1.

Table 1 | Ranking of Gini coefficient on market income (2008)

Country	Gini m.i.
Sweden	0.426
Netherlands	0.426
U.K.	0.456
Spain	0.461
France	0.483
Germany	0.504
Italy	0.534

Source: OECD.

The first output is the dendrogram (Figure 3) that measures the dissimilarity among country profiles.

Figure 3 | Dendrogram
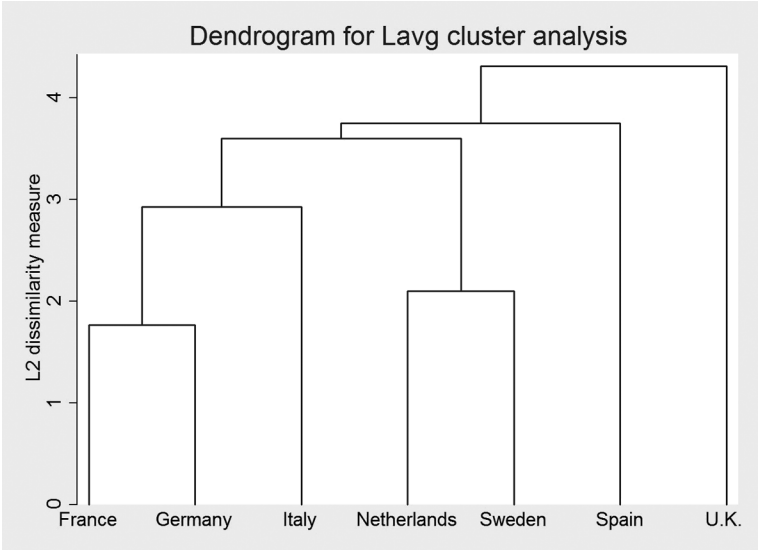
Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

In the first approximation, Figure 3 measures the distance among the countries, and in particular Table 2 shows how the clusters formed on the basis of the distance are consistent with the inequality ranking (Figure 2). In fact, the first group includes France, Italy and Germany (highly unequal countries). The second contains Sweden and The Netherlands (low inequality), while Spain and the United Kingdom (mid ranking countries) form two distinct groups 3 and 4, respectively. Despite the similar values of the Gini coefficient for Spain and United Kingdom, it is impossible to include them in the same cluster because of their deep-rooted differences (see Table 2) in the labour market structure.

Table 2 | Clusters

	geo	types
1.	France	1
2.	Germany	1
3.	Italy	1
4.	Netherlands	2
5.	Spain	3
6.	Sweden	2
7.	U.K.	4

Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

In particular, the unemployment rate in Spain was 11.3% (recently increased about 23%; source WDI), while the unemployment rate in the United Kingdom was around 5%. Spain's share of non-standard workers was 29%, while the United Kingdom's was only 5.4%. The Employment Protection Legislation in Spain had the highest restriction variable in the sample at 3.11, while in the United Kingdom it was the lowest at 1.09 (note that this variable can take values from 0 for minimum restrictions to 6 for maximum restrictions). These opposing values don't allow the analysis to include the mid-ranking countries in the same cluster. In spite of these peculiarities, the cluster analysis' outcome shows how these variables are useful in explaining the phenomenon of economic inequality recorded on primary income distribution. In fact, the analysis creates groups consistent with the level of concentration of income.

Principal Component Analysis

After the cluster nalysis, the most important variables that determine the clustering are shown through principal component analysis. The goal is to understand which of the seven variables used are the most important for economic inequalities.

The first output of the principal component analysis (Table 3) shows that 88.7% of the total data-set variability is explained by the first three components (the main ones of the seven used). In fact, both Table 3 and Table 4 show that the first three eigenvalues, associated with the first three eigenvectors (or principal components) are the highest. The remaining four components do not show relevant rates of variability.

Table 3 | **PCA Output 1**

```
Principal components/correlation            Number of obs   =          7
                                            Number of comp. =          3
                                            Trace           =          7
        Rotation: (unrotated = principal)   Rho             =     0.8871
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	2.74886	.11375	0.3927	0.3927
Comp2	2.63511	1.80947	0.3764	0.7691
Comp3	.825636	.281914	0.1179	0.8871
Comp4	.543721	.402095	0.0777	0.9648
Comp5	.141627	.0365718	0.0202	0.9850
Comp6	.105055	.105055	0.0150	1.0000
Comp7	0	.	0.0000	1.0000

Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

In particular in Table 4, one can see the importance of the three main components; specifically the first and most important of all, accounts for about 37%, the second about 30% and the third about 22% of the total variability.

The fact that no component captures a particularly high percentage of variability shows the multidimensionality of the phenomenon.

Table 4 | **PCA Output 2**

```
Principal components/correlation                Number of obs    =         7
                                                Number of comp.  =         3
                                                Trace            =         7
         Rotation: orthogonal varimax (Kaiser off)  Rho          =    0.8871
```

Component	Variance	Difference	Proportion	Cumulative
Comp1	2.5803	.485349	0.3686	0.3686
Comp2	2.09495	.560604	0.2993	0.6679
Comp3	1.53435	.	0.2192	0.8871

Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

Table 5 shows which of the variables used are the most influential in the analysis.

Table 5 | **PCA Output 3**

```
Scoring coefficients for orthogonal varimax rotation
    sum of squares(column-loading) = 1
```

Variable	Comp1	Comp2	Comp3
zlabf_ed	-0.0245	0.7052	-0.1319
zgdp_gm	0.0351	0.6279	0.1189
zun_m	0.5677	0.0814	-0.2019
znonst_em	0.4641	0.2214	0.2628
zg_ed	-0.4639	0.1601	0.3255
zepl	0.4950	-0.1615	0.2995
zg_lmp	-0.0148	-0.0333	0.8143

Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

The first component is characterized by the variables of the labour market's structure, that in order of representativeness are: (1) unemployment rate (zun_m); (2) employment protection legislation ($zepl$); and (3) ratio of non-standard employment ($znonst\_em$). Regarding the second component, the principal variables are (1) ratio of educated workers ($zlab\_ed$) and (2) GDP growth rate ($zgdp\_gm$). Instead regarding the third component, the characteristic variable is the ratio of

expenditure on active labour market policies (*zg_lmp*). This is supported in Table 6 that shows correlations between principal components and variables.

**Table 6 | Correlations among variables and dimensions**

	c1	c2	c3	zlabf_ed	zgdp_gm	zun_m	znonst~m	zg_ed	zepl	zg_lmp
c1	1.0000									
c2	-0.1261	1.0000								
c3	0.2273	0.4320	1.0000							
zlabf_ed	-0.2053	0.9550	0.2686	1.0000						
zgdp_gm	-0.0247	0.9654	0.5527	0.8510	1.0000					
zun_m	0.8401	-0.1053	0.0080	-0.1331	-0.0891	1.0000				
znonst_em	0.7791	0.3670	0.6334	0.1976	0.5137	0.4700	1.0000			
zg_ed	-0.6828	0.4999	0.3339	0.4983	0.4069	-0.4387	-0.3282	1.0000		
zepl	0.9090	-0.1738	0.4508	-0.2355	-0.0918	0.7276	0.7346	-0.4630	1.0000	
zg_lmp	0.2116	0.3904	0.9824	0.2370	0.5158	0.0077	0.5753	0.2969	0.4216	1.0000

Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

The first component has a correlation of 0.9 with the variable *z_epl*; 0.84 with *zun_m* and 0.78 approximately with *znonst_em*. The second component is strongly correlated with variables *zgdp_gm* and *zlabf_ed* with coefficients equal to 0.96 and 0.95 respectively. The third component shows a correlation of 0.98 with the variable *zg_lmp*. Given the characteristic variables of each component, the first of these principal components C1 is named "Labour market", the second component C2 is "Growth" and the third C3 is named "Public Expenditure on LMP" because it is characterized almost exclusively by this variable.

Graphical summaries of this analysis are shown in the factorial maps (Figures 4, 5 and 6).

Figure 4 | Principal plane
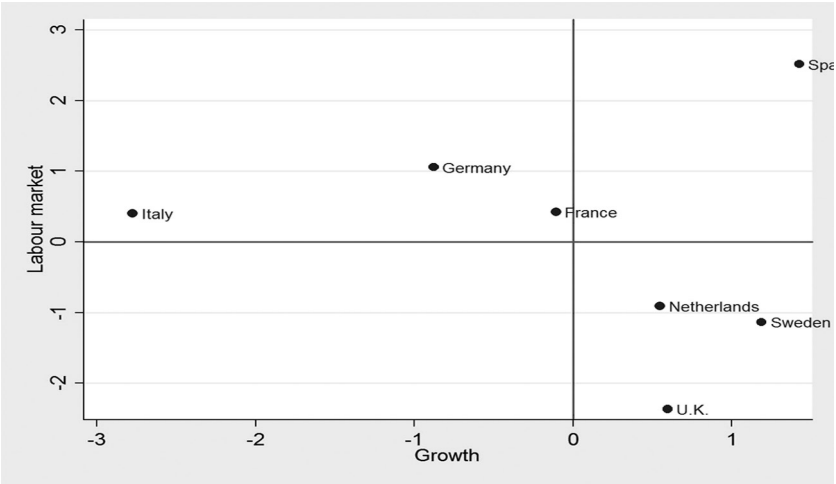
Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

Figure 4 is called the principal plane because it is made up of the first two and most informative principal components showing Italy, France and Germany (countries with high inequality) in the upper left quadrant.

In particular, Italy has a position determined by its lower growth rate and the smaller number of workers with tertiary education along the "Growth" dimension. Sweden and The Netherlands are present in the bottom right quadrant, characterized by low unemployment rates with regard to the "Labour market" dimension and by good performance regarding the "Growth" dimension. Finally, in the graph is possible to see the opposite positions of Spain and the United Kingdom with regard to the "Labour market" dimension that doesn't allow them to be included in the same cluster as shown above.

Analyzing the second factorial map (Figure 5) based on the first and third principal components, it is possible to find a good approximation of the coordinates of the first map.
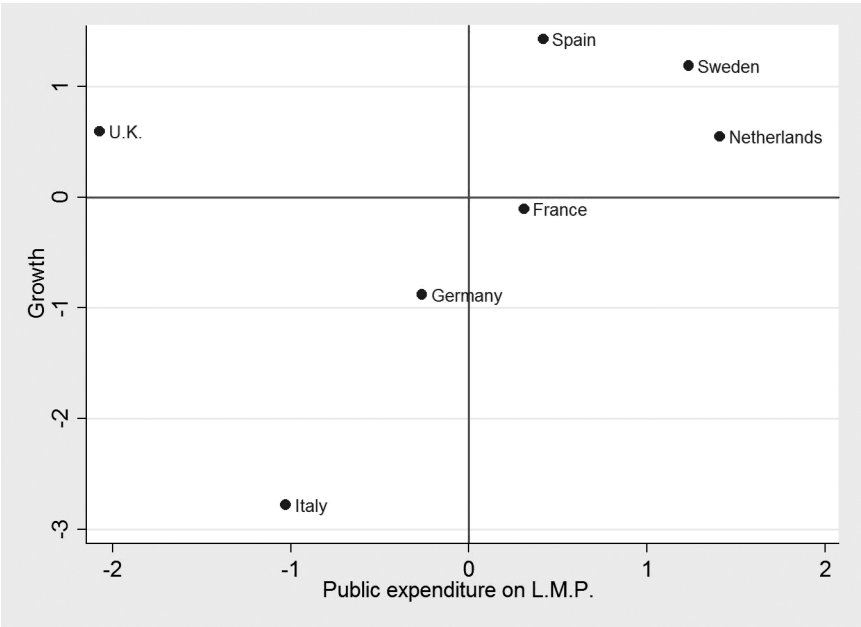
Figure 5 | First and third principal components
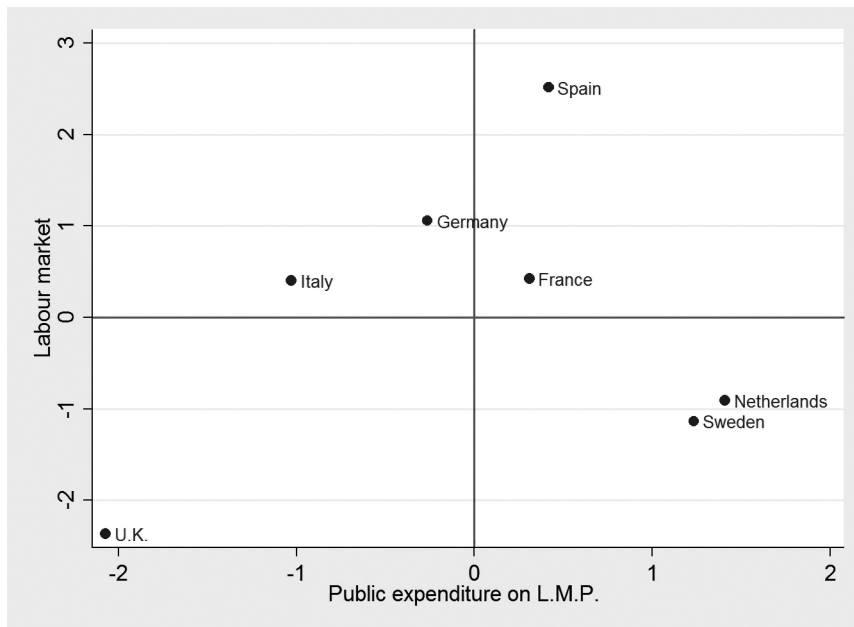
Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

It is again clear to see the same groupings: Italy, France and Germany in the centre of the graph; the clustering of Sweden and The Netherlands (due to high levels of public spending on active labour market policies); and the contrast between the United Kingdom and Spain, opposites on the labour market dimension as in Figures 4 and 5.

Figure 6 | Second and third principal components

Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

Finally, Figure 6 that is based on the second and third components is the less significant combination. Nevertheless, valid links remain between The Netherlands and Sweden with high performance on both dimensions; the proximity between France and Germany with Italy nearer the origin of the axes (due to low levels of the variables that characterize the two components); and finally the distance between Spain and the United Kingdom with respect to the dimension on the x-axis.

In general, despite the complexity of the phenomenon, the analysis presented at these two levels (cluster analysis and principal component analysis) shows the importance of labour markets on the dynamics of inequality.

In particular, with respect to the findings, it appears that the most important factors in market income distribution are primarily related to the structure of the labour market according to the following aspects: unemployment; kind of contract; employment protection legislation; and diffusion of active labour market policies. Also important are the aspects of labour demand (economic growth) and labour supply (educated workers are the "quality" on the supply side).

However, given that the labour market is a complex institution in itself, each variable considered here weights in different degrees and plays a different role in each context. This is more clearly seen when each specific country is analyzed.

Regarding the group of countries with high market income inequality, one can see that Italy (the country with the highest degree of inequality) occupies a critical position with respect to the second dimension ("Growth"). In fact, in Italy one finds both the lower GDP growth rate among the sample (0.88%, that means weak labour demand) and the lower ratio of educated workers (15.7% of the labour force against the 27% on average in the sample). In relation to the variables that characterize the first principal component (EPL, unemployment and workers' non-standard share), no particular quantitative problems are evident. However, an in-depth analysis shows that during the last ten years in Italy, employment protection legislation for non-standard workers has steadily deteriorated. In particular from 2000 to 2008 it fell from 3.25 to 2, measured with employment protection legislation (EPL) index (source: OECD). Also for this reason, the duality of the labour market in Italy increased and as a result there is a higher degree of inequality.

The countries with the lowest inequality levels (Sweden and The Netherlands) are characterized by a combination of low unemployment (respectively around 6% and 4%), the diffusion of education (30% of the labour force has tertiary education) and the large proportions of non-standard workers (16% and 18%). The combination of this is associated with widespread use of part-time contracts (26.6% and 47%; source: Eurostat). Taking into consideration the important role of employment support given by active labour market policies (for which the expenditure is the highest of the sample around 1% of GDP in both countries), these factors constitute the so-called "flexsecurity" model that guarantees high employment and limited inequality in the labour market. These factors also absorb the labour force's marginal components, typically the young, the elderly and women.

As seen from the cluster analysis, Spain has a unique profile that is difficult to interpret. It presents the following aspects: the highest unemployment rate in the sample (around 11%; today more than doubled); the highest ratio of non-standard workers (around 29%); the most strict EPL; high diffusion of education (30% of the labour force with tertiary education); and the highest GDP growth rate in the sample (3%).

This anomalous profile seems to anticipate the very difficult recent economic situation in Spain. Finally the United Kingdom has a profile characterized by poor employment protection legislation (degree of EPL is the lowest of the sample, 1.09.); high efficiency in terms of GDP growth and "quality" of labour force (approximately 32% have a tertiary education); and a flexible labour market more oriented to the use of part-timers (25% of workers, source: Eurostat) than to the use of non-standard contracts (only 5% of the labour force).

| Labour market and income concentrations in selected transition countries: analysis models

In this section, the analysis approach used for selected European countries is repeated for selected transition countries.

In 2008, the level of inequality in primary income distribution for selected transition countries (Estonia, Poland, Czech Republic, Russia, Slovenia and Hungary) is shown in Figure 7. As in the previous section, Gini coefficient refers to 2008 and is calculated on the total population and on the income before taxation and transfers.

Figure 7 | **Gini coefficient on primary income distribution; selected countries 2008**

Gini market income 2008

Source: elaboration on OECD data.

Slovenia and Czech Republic are, for disposable income distribution, the countries with the lowest degree of inequality. Instead, Russia clearly presents the highest level of inequality, and the same is found for secondary distribution.

Estonia, Hungary and Poland are located in the middle of the ranking. In particular Estonia, changes its position with respect to the secondary distribution (source: OECD). Looking at disposable income, it is one of the most unequal countries after Russia, even if inequality has been reduced in Estonia in the latest years with respect to other Baltic Republics.

Cluster Analysis

As in the prior section to interpret the market income inequality levels, the role played by the labour market on these dynamics is examined through cluster analysis and principal component analysis.

The most recent data available is for 2008 and the dataset includes the same variables of the previous analyses with the same sources. The only exception is the use of a proxy to identify the degree of institutional weaknesses in these countries as measured by a Corruption Perception Index (CPI) of internal corruption provided by Transparency International.

Having identified the fragility of the institutions correlated with corruption, the research is somewhat simplified, but the idea is that widespread institutional fragility could be positively related to inequality degrees.

Note that the CPI moves up from 0 that indicates high corruption and institutional weakness to 10 that indicates low corruption or institutional solidity. The inclusion of this variable is justified by the fact that these countries show, on average, higher levels of perceived corruption than Western European countries, with the exception of Italy. In particular, the average CPI for the transition countries is 4.8, while for the selected European countries it was 7.3. These variables were appropriately standardized to make them comparable.

The exact values of the Gini coefficient on market income are shown in Table 7.

Table 7 | **Ranking of Gini coefficient on market income, 2008**

Country	Gini M.I.
Slovenia	0.423
Cz. Rep.	0.444
Estonia	0.458
Hungary	0.466
Poland	0.470
Russia	0.561
Source: OECD.	

In the first half of the scale, Slovenia, Czech Republic and Estonia are found (low inequality countries), while Hungary, Poland and Russia (high inequality countries) are found in the second half of the scale.

As before, the first output obtained by cluster analysis is the dendrogram, which provides the first measure of the distance among the vectors representing the different countries.

Figure 8 | **Dendrogram**
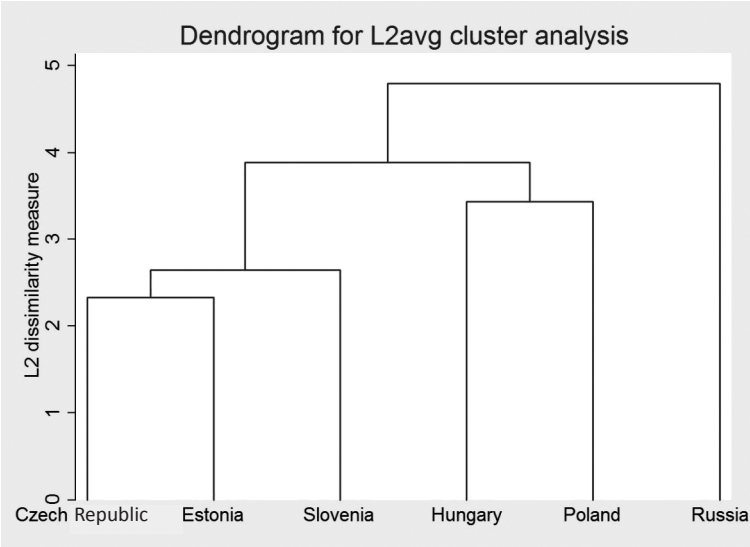
Source: author's calculation on OECD, EUROSTAT, WDI and Transparency International data using STATA software.

In Figure 8 we see the distances among the countries in the sample with respect to the dataset used.

Table 8 shows the three clusters created on the basis of the information provided by the dendrogram.

Table 8 | **Clusters**

	geo	type
1.	Czech Repubblic	1
2.	Estonia	1
3.	Hungary	2
4.	Poland	2
5.	Russia	3
6.	Slovenia	1

Source: author's calculation on OECD, EUROSTAT, WDI and Transparency International data using STATA software.

The clustering is consistent with the ranking. The first group includes Czech Republic, Estonia and Slovenia (the countries in the first half of the Table 7); the second group is Hungary and Poland; and the third group has only Russia.

The most unequal countries are divided into two groups, by underlining the Russian peculiarity (which is already evident in the dendrogram) and by the clearly higher level of Gini coefficients with respect to Poland and Hungary.

Principal Component Analysis

Principal component analysis is again used to understand which variables have had a significant role in the clustering.

From Tables 9 and 10 emerges, one can explain 90% of the overall variability of the dataset through the first three principal components. The first three eigenvalues, associated with the first three eigenvectors (or principal components) are the highest (Table 9).

Table 9 | **PCA Output 1**

```
Principal components/correlation              Number of obs    =         6
                                              Number of comp.  =         3
                                              Trace            =         8
        Rotation: (unrotated = principal)     Rho              =    0.9061
```

Component	Eigenvalue	Difference	Proportion	Cumulative
Comp1	3.57771	1.00498	0.4472	0.4472
Comp2	2.57273	1.47473	0.3216	0.7688
Comp3	1.098	.506002	0.1372	0.9061
Comp4	.591997	.432427	0.0740	0.9801
Comp5	.15957	.15957	0.0199	1.0000
Comp6	0	0	0.0000	1.0000
Comp7	0	0	0.0000	1.0000
Comp8	0	.	0.0000	1.0000

Source: author's calculation on OECD, EUROSTAT, WDI and Transparency International data using STATA software.

Moreover, the second output (Table 10) shows more clearly the contribution that each component provides for the explanation of the total variability of the data. In particular, the first component explain about 40%, the second about 26% and the third about 24%; while the other components represent irrelevant percentages of the variability.

Table 10 | **PCA Output 2**

```
Principal components/correlation                    Number of obs   =         6
                                                    Number of comp. =         3
                                                    Trace           =         8
         Rotation: orthogonal varimax (Kaiser off)  Rho             =    0.9061
```

Component	Variance	Difference	Proportion	Cumulative
Comp1	3.19741	1.07368	0.3997	0.3997
Comp2	2.12372	.196421	0.2655	0.6651
Comp3	1.9273	.	0.2409	0.9061

Source: author's calculation on OECD, EUROSTAT, WDI and Transparency International data using STATA software.

The variables that have the most influence on the first of the principal components are: Employment Protection Legislation (projected for 58% of its real dimension) and the proxy of institutional weakness (almost 50%). Ranked on the second component are: the share of non-standard workers (70%), the expense on active labour policies (around 64%) and unemployment (even if it is less than the others, 17%). Ranked on the third component are: GDP growth rate (70%) and the share of educated workers (to a lesser extent, 23% of its real dimension).

Table 11 | **PCA Output 3**

```
Scoring coefficients for orthogonal varimax rotation
    sum of squares(column-loading) = 1
```

Variable	Comp1	Comp2	Comp3
zlabf_ed	-0.3685	-0.1654	0.2382
zgdp_gm	-0.0264	0.0927	0.7085
zun	-0.4055	0.1671	-0.5092
znonst_em	-0.0562	0.7000	0.1271
zg_ed	0.3346	-0.0322	-0.3485
zepl	0.5842	0.1278	0.1427
zg_lmp	0.0945	0.6360	-0.1183
zcpi	0.4835	-0.1560	-0.1002

Source: author's calculation on OECD, EUROSTAT, WDI and Transparency International data using STATA software.

The study of the correlations among the components and variables (Table 12) confirms what the research found previously. The highest correlations for the first component are with EPL (0.96) and corruption (0.93). For the second component, it is with the share of non-standard workers (0.97) and with the spending on active labour policies (0.96). Finally for the third component, the highest correlation is with average GDP growth rate (0.95).

**Table 12 | Correlations among variables and principal components**

	c1	c2	c3	zlabf_ed	zgdp_gm	zun	znonst~m	zg_ed	zepl	zg_lmp	zcpi
c1	1.0000										
c2	-0.0929	1.0000									
c3	-0.3178	-0.3155	1.0000								
zlabf_ed	-0.7416	-0.2842	0.6161	1.0000							
zgdp_gm	-0.3723	-0.1708	0.9560	0.7064	1.0000						
zun	-0.5230	0.5339	-0.5533	0.1503	-0.3675	1.0000					
znonst_em	-0.2512	0.9737	-0.1135	-0.0937	0.0334	0.5000	1.0000				
zg_ed	0.7564	0.0501	-0.6591	-0.5014	-0.5963	0.0156	-0.1251	1.0000			
zepl	0.9644	0.0267	-0.1926	-0.6281	-0.2014	-0.5239	-0.0986	0.7457	1.0000		
zg_lmp	0.1351	0.9629	-0.5103	-0.4834	-0.3716	0.5060	0.8782	0.2854	0.2208	1.0000	
zcpi	0.9299	-0.2637	-0.3421	-0.6263	-0.3595	-0.4199	-0.4291	0.7325	0.8587	-0.0223	1.0000

Source: author's calculation on OECD, EUROSTAT, WDI and Transparency International data using STATA software.

The graphical summary of the analysis is shown next by factorial maps. In this case, the first component is called "Institutions", the second is called "Labour market" and the third is called "Growth", in line with the decisive variables for each component.

Figure 9 represents the principal plane, constituted by the most important components in terms of information given by the analysis.

Figure 9 | Principal plane
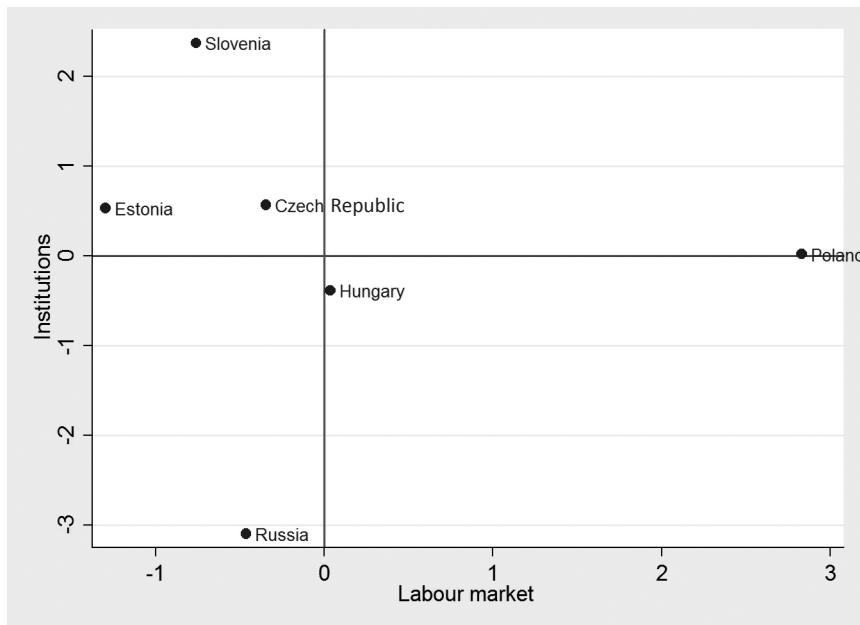
Source: author's calculation on OECD, EUROSTAT, WDI and Transparency International data using STATA software.

The lowest inequality countries (Slovenia, Czech Republic and Estonia) are located in the upper left quadrant, representing jointly a relatively high protection of workers and a relatively high degree of institutional solidity.

The second group of countries (Hungary and Poland) is characterized by a higher unemployment rate than the first group of countries (along the abscissa). In particular, Poland's position is influenced by its greater percentage of non-standard workers and higher spending for active labour market policies.

Finally, Russia is found near the origin of the axis. This position stresses Russia's problems along the institutional dimension. Russia is the country that has the lowest degree of employment protection legislation and the highest level of institutional weakness.

Figure 10 is based on the first and third principal components and shows a relatively low average growth rate in Hungary (2.8%), a relatively strong average growth for the rest of the countries (between 5% and 6%), peaking with Russia's GDP growth rate economy (7%). Of course, is still possible to assess the position of Russia along the x-axis due to its low levels of EPL and its high CPI.
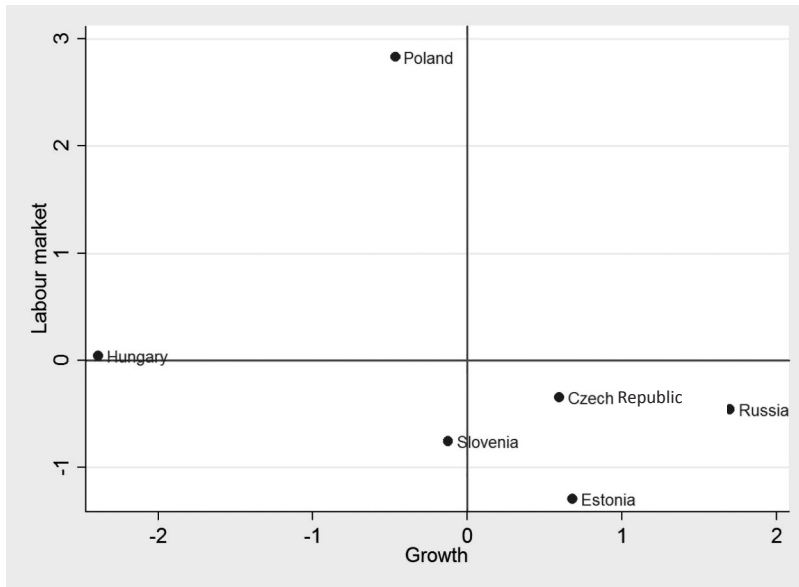
Figure 10 | First and third principal components
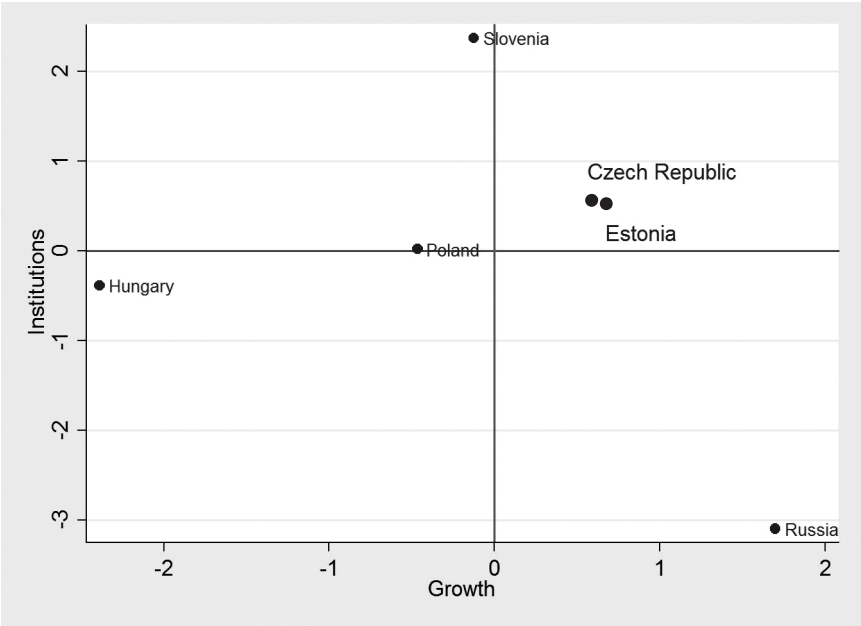
Source: author's calculation on OECD, EUROSTAT, WDI and Transparency International data using STATA software.

Finally, the plan which is the least relevant is based on the second and third principal components (Figure 11). It confirms the particular position of Poland along the dimension of the "Labour Market" due to reasons stated previously, with the position of Hungary characterized by relatively low growth. The other countries are positioned so as to highlight, in particular, their good performance related to growth, with Russia in the lead.

Figure 11 | **Second and third principal components**

Source: author's calculation on OECD, EUROSTAT, WDI and Transparency International data using STATA software.

In summary, cluster analysis has provided a consistent outcome coherent with degrees of inequality. The groups created on the basis of the dataset used correspond to the concentration levels of market income recorded within the same countries. The principal component analysis has also provided more in-depth results, providing information about the most influential variables. The findings show that the most important factors are: 1) the institutional dimension and 2) the labour market structure. Institutional weakness, in particular, plays a key role in Russia.

Finally and less important, economic growth has an effect on the dynamics of inequality; nevertheless, to identify a systematic relationship between GDP growth rate and inequality is difficult. All these countries in those years grew rapidly (more than 5%, with the exception of Hungary) but with great dissimilarities in their distributive outcome. Specifically with regard to the group with lower market income inequality (Slovenia, Czech Republic and Estonia), in addition to the institutional dimension, the distinctive features are low unemployment rates (with Slovenia and the Czech Republic at 4.4% and Estonia at 5.5%) and low shares of non-standard workers (5% of the labour force on average). Note that Estonia, as previously stated, is a high inequality country when one looks at disposable income, like the United Kingdom in the previous analysis.

In particular, Slovenia is recognized by OECD (2009) to be "on track" to create a model of "flexsecurity" like northern European countries, considering its recent labour market reform. This is

true even if (as the OECD says) to fully achieve such a model, it is necessary to implement more part-time and non-standard contracts, and increase contemporaneous employment security. Then it would be necessary to enhance employment services and activities of life long learning so that supply and demand matching improve.

The second group, composed of Hungary and Poland, has a higher unemployment rate (around 8% and 7% respectively) with respect to the first group. This factor is what most distinguishes these countries from the first group and caused a split in the two clusters. Of particular interest is the profile of Poland, which recorded an unusual share of non-standard workers (27%) and a higher share of spending on active labour market policies (0.6% of GDP, and even more in the last few years). A large proportion of non-standard workers and the high expenses of labour policies have been instrumental in reducing the high unemployment rate. That has been one of the main drivers of inequality in this country since the start of the transition process. Finally with regard to Russia, it is immediately seen that this country shows an anomalous profile compared to the others. This was also evident when using Cluster Analysis because it was not possible to aggregate it to other countries.

Recorded high inequality is associated with two peculiarities. First, workers with the lowest level of protection (an EPL index equal to 1.8, compared to an average of 2.30 in the sample) are associated with a high segmentation of the labour market, supported by strong decentralization of wage bargaining (OECD, 2011b).

Second, the institutional weakness recorded by the index of perceived corruption is the highest figure in the sample. This widespread phenomenon undermines any economic process or progress and therefore, the solution to this problem is as important as resolving the complex structure of the labour market.

| Focus on drivers of inequality in Russia and Poland

In relation to the findings, it was decided to investigate further both Russia and Poland (the two main countries in the sample), whose economic policy choices have led to very different results.

Russia: inequality key factors from the recent past to today

With regard to Russia's recent past, relevant literature (Mitra, Yemstov 2006) proposed some key factors that may have led Russia to have its high level of inequality. Some of the main factors considered are the following:

1) Macroeconomic policy

In the early 1990s, Russia was one of the nations that more than others, and for more time adopted the corpus of macroeconomic policies drawn up in the so-called Washington Consensus, by the International Monetary Fund, the World Bank and the United States.

This package of hyper-liberal macroeconomic measures, involved high interest rates, high inflation (unavoidable in any economic scenario), and cuts in social expenditures. In general, this package brought a range of shocks to the economy, worsening the income distribution. Some of these were necessary and others were probably unnecessary overshooting, (see Kolodko, Nuti 1997).

2) Privatization process

Privatizations involve, by definition, a reallocation of property rights. They are processes that occurred in each of the former socialist countries in different ways and times. Having been one of those countries, Russia adopted the system of so-called "mass privatization" as did Moldova and Armenia.

"Mass privatization" is a program of rapid and universal privatization of public assets that aims to transfer the ownership of these assets into a wider part of the populace. This kind of process, together with the substantial absence of institutional controls, made inequality rise enormously in Russia. Note that the Gini coefficient increased from around 27% in 1989 to approximately 43% in 1992.

Leaving the primary factors of the past behind, and concentrating on the actual main drivers of inequality in modern Russia, the importance of the labour market structure can be seen, according to the relevant literature (OECD 2011) and the previous analysis.

3) Labour market structure

In the past as today, many aspects of the Russian labour market sustain the high level of inequality. In particular, the actual minimum wage in Russia is only 24% of median income against an OECD average around 40%; before 2009 it was just 10%. The expenditures on active labour market policies of 0.1% of GDP rising to 0.3% in 2009 are still low, considering that the OECD average is around 2% of GDP. Another important factor of inequality in this country is the strong degree of decentralization of bargaining for wages. This model has become the simplest way to reduced salaries paid by the firms, in spite of its original goal to provide incentives for higher productivity levels.

In this context there are unequal wage scales among workers. Particularly penalized are the workers in small firms that, generally speaking, have lower productivity with respect to other workers and have lower bargaining power against the entrepreneurs. Finally, the employment protection legislation index is the lowest of our sample (1.8 as previously noted) and is not stan-

dardized among firms, sectors and regions (always because of decentralization). In general, it is possible to assert that the strong segmentation of the labour market contributes widely to high inequality in this country.

4) Institutions

The institutional framework in Russia appears to be still immature compared to other industrialized countries. This institutional fragility emerges from the high levels of corruption (CPI reporting equal to 2.4 in 2011) and also from the levels of the shadow economy. The widespread underground economy is an important aspect of Russian institutional weakness, given that the estimate is around 40% of GDP (Schneider 2010). Nevertheless, in this research the underground economy was not considered as a key factor of inequality. In fact, it would be very hard to predict the effect of institutionalization of the entire shadow economy on the distribution of disposable income. Some authors (for instance, Kolodko 1998) say that the shadow economy is not a zero sum game, and its institutionalization might present an increase in inequality. This institutional immaturity summarized in the previous analysis creates very fertile ground for the rise of new inequalities and for maintaining the old regime, consolidating the so-called oligarchies.

Poland: inequality key factors from the recent past to today

Poland has registered more stability since the start of transition, both in terms of economic growth and of equality as compared to Russia.

With regard to Poland's post transition path, it can be divided into two distinct parts. From 1989 to the first half of 1993, it was led by the Washington Consensus policies through the so-called "shock therapy". From the second half of 1993 to 1997, it was led by the package of macro- and microeconomic measures called "Strategy for Poland", complemented later by "Package 2000". The interventions used in the second period are considered to be the cause of Poland's better performance compared to Russia.

"Strategy for Poland" allowed it to balance the objectives of growth with those of equity, for example, through fiscal policies, pension reform and managing the privatization process. The main tools of the fiscal policies were tax burden reductions (income tax rate tiers were reduced from 21%, 33% and 45% to 19%, 30% and 40% respectively) to encourage investment and the absorption of the shadow economy into the regular economy. Then, public expenditures were cut from 32%-34% of GDP before 1993 to less than 30% in 1996 without cutting social expenditures. To reduce expenses and inequality (because of the unequal indexation with respect to salaries) a pension reform was also launched, changing the system from a so-called "pay as you go" to a capitalization one. In this way, pensions had three elements: a basic public pension available to

all; compulsory contributions based on income received; and voluntary contributions. Another important aspect of the strategy that allowed Poland to perform better was the containment of inflation through a social pact, which provided for both moderating wages, and hence prices, and for maintaining employment.

Finally, the privatization process was part of the transition. Since the 1980s, Poland was the socialist state with the most developed private sector, with 30% of the labour force employed in private business. This compared to an average of 10% of other similar countries, with a minimum of about 2% in former Czechoslovakia (Milanovic 1998). This allowed a less traumatic transition; however, privatization was supported by a precise strategy of so-called commercialization. This strategy consisted of the preliminary creation of joint stock companies and entrusted their management to a board of experts and independent individuals, able to sell the public enterprises at remunerative prices on the stock market. Commercialization was not an alternative to privatization but a preliminary step that allowed Poland to maximize the results of the subsequent sale to private investors. This form of "assisted" privatization avoided the unjustified accumulation of economic resources that were previously State-owned into the hands of a few individuals.

With regard to the past ten years, the increase of inequality is more related to the labour market than to the typical factors of the transition. In particular, it seems that the unemployment rate has guided inequality in Poland in recent years. Since the early years of transition, Poland's economic history has been accompanied by a high level of unemployment. Nevertheless, its importance has grown in this period, both in absolute and relative terms, while other factors like pensions and privatization that guided the initial increase in inequality in the early years of transition have steadied.

Figure 12 first shows that the unemployment rate in Poland has always been very high on average. In particular, one can see two prominent peaks: the first following the first years of transition (16.4% in 1993), then reduced due to the "Strategy for Poland" until the late 1990s. The second peak in the year prior to entry into the European Union (20% in 2002). After 2005, Poland has had substantially steady reductions of the phenomenon until the start of the current global economic crisis.

Figure 12 | **Unemployment rate in Poland from the early years of transition to today**
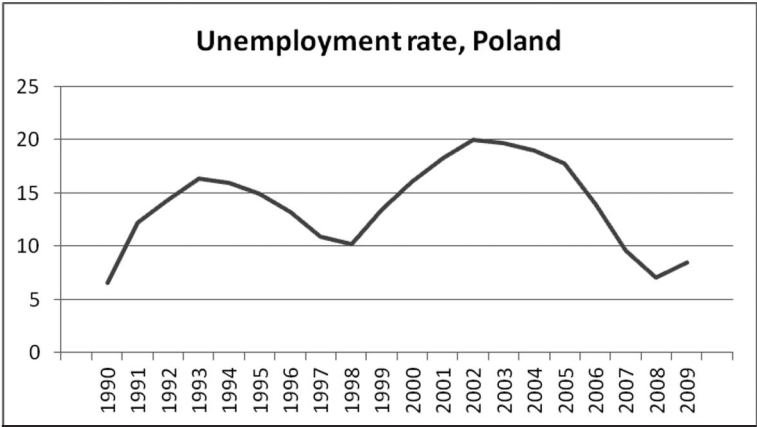
Source: author's elaboration of EBRD data.

Between the late 1990s and the beginning of 2000, as a result of the reduction in GDP growth, unemployment began to rise, peaking in 2002-2003. This led to the collapse of structures such as employment agencies and state funds like the fund created for work (OECD, 2003). The subsequent recovery of the labour force was obtained through three channels.

The first was the increase of expenditures in active labour market policies (and the economic support of the European Union) steadily increasing to 2005. Then it reached 0.6% of GDP in 2008 and more than doubled in 2009, reaching almost 1.3%, second only to Belgium and Denmark (OECD data). The second channel, in harmony with the first, was the decentralization of the management of unemployment at the local levels through the creation of autonomous offices, which managed funds for specific needs (OECD, 2009). The third channel was the widespread use of new types of contracts, typically non-standard ones. This is considering that in 1999, the share of these worker contracts was 4.6% and steadily increased to 27% in 2010 (source: Eurostat). The use of non-standard contracts allowed the absorption of a large portion of the unemployed. Today, Poland is the European country with the greatest percentage of these kinds of contracts, exceeding even Spain (historically the European country where they were most used).

The importance of unemployment in the dynamics of inequality in Poland is supported by estimates of the correlation between the unemployment rate and the Gini coefficient on market income. The correlation is strong for the entire period from 1990 to 2009. Table 13 shows a coefficient equal to 0.67, but in line with the previous discussion, was also strengthened in the data from the end of the 1990s until today, where the correlation coefficient reaches a value greater than 0.88 (Table 14).

Table 13 | Correlation between unemployment and Gini coefficient (market income) from 1986 to 2008, Poland

	ginimi	un
ginimi	1.0000	
un	0.6743	1.0000

Source: author's elaboration of EBRD data.

Table 14 | Correlation between unemployment and Gini coefficient (market income) from 1999 to 2008, Poland

	ginimi	un
ginimi	1.0000	
un	0.8878	1.0000

Source: author's elaboration of EBRD data.

Therefore, the unemployment rate appears to be intrinsically linked with the distribution of income in Poland for the whole period from the beginning of transition to today, with a significant increase over time.

To summarize the comparison with what Professor Kolodko, Director of the TIGER Institute in Warsaw, emphasized during a recent interview, the main differences between the Russian and the Polish transition experiences are substantially three factors:

1) initial conditions prior to the transformation process from socialist economies to market economies;

2) current position of their institutional paths;

3) different political mechanisms in the two countries.

With respect to the first factor, the preparation in terms of market oriented reforms that has been taking place in Poland since the 1980s is considered one of the main reasons for Poland's better performance during the period of transition. In fact, Poland after 1980 already was equipped with an economic institutional apparatus that no other socialist country had, except Hungary. In particular there were governing bankruptcy laws, antitrust laws and regulation of foreign investment. In addition, 50% of prices were already liberalized before the transition, and in 1989 there was a parallel free market exchange rate.

Furthermore 30% of GDP was produced in the private sector, which also included financial institutions. This regulatory institutional apparatus allowed a more transparent allocation of resources and permitted both economic growth and equity. In Russia, this was lacking, so any economic activity was under state control. Given that the private sector did not exist, there was not any discipline for this sector. This favoured the increase of inequality among a few privileged classes and the rest of society (in particular during the privatization process).

In relation to the second factor, the direction of the respective institutional paths undertaken by the two countries has certainly played and will continue to play a key role.

With regard to Poland, its entry into the European Union in 2004, influenced the recent past and near future, with the adoption of the *acquis communautaire* that clearly defines the direction that this country must follow from a regulatory and institutional standpoint. After Poland became an EU member, its range of choices became limited, but it also allowed for the acquisition of greater certainty and more political-economic stability.

Meanwhile, Russia had a more ambiguous path with respect to its economic and international geo-political position that allowed it more choices, but it seems to have been more oriented towards authoritarian tendencies.

The third factor is closely related to the second. If one looks at recent history, it is possible to say that Polish democracy has created a "healthy alternation" between the different political parties; this was not observed in Russia. One can recognize only two macroeconomic and political stages: the Yeltsin period and the Putin period. The first period was characterized by hyper-liberal economic policies, dictated by the Washington Consensus, which caused inequality and recession to rise. The second period is still in progress and is characterized by an hybrid economy between market and state. This is shown by from 2004 to 2007, the state's share of the oil industry went from 20% to 50%, and the state's share in the financial sector rose to 38% (EBRD, 2007).

As Domenico Mario Nuti (2009b) stated: "The Russian model change is perfectly legitimate. The problem is that changing your destination when you are half way there, you definitely increase the cost and the duration of the journey."

Looking at the prospects of inequality in these two countries, one can say that Poland probably will face problems common to most other European countries related to its labour market structure. Russia must still face institutional and regulatory issues today, despite some measures previously taken in the labour market field (OECD 2010). It seems locked into what was called a systemic vacuum (Aghion, Blanchard 1993), now more institutional than economically productive.

| Comparing the results: European and transition countries

Comparing the results for European countries with other countries in transition, it is possible to highlight some significant issues.

With regard to the lower market income inequality groups (i.e. Sweden and The Netherlands for Europe, and Slovenia, Czech Republic and Estonia for the transition countries), the main common characteristic is a low unemployment rate (5% on average) underlining the labour market capacity to include all categories of supply. Naturally these two groups also present other signifi-

cant differences with respect to the diffusion of non-standard contracts and the expense of active labour market policies. The northern European countries use a greater ratio of non-standard (17% of the labour force) and part-time employment than low inequality income transition countries (5% on average). They spend much more money on active policies such as life long learning and employment services (more than 1% of GDP against 0.15% on average in Slovenia, Czech Republic and Estonia). This allows them to also absorb the marginal component of the labour force (a typical aspect of the "flexsecurity" labour market model).

Despite these differences, mostly Slovenia and also Estonia are recognized by OECD as the main candidates to fully adopt a "flexsecurity" labour market model, in consideration of their recent labour market reforms. These were oriented to facilitate the matching between demand and supply through an increase of active labour market policies.

Despite singular examples among the different countries, it seems that the more or less mature the "flexsecurity" model, the ability to ensure the containment of income inequality exists and is more facilitated with respect to other market models.

Regarding the countries with higher inequality (among those analyzed), the comparison is particularly interesting between Italy (the most unequal country in reference to market income in Europe) and Poland (the most unequal in the sample transition countries, except Russia). In the first approximation, the two countries have similar characteristics with respect to unemployment rates (around 7%) and with respect to the degree of employment protection legislation. The EPL index for the labour force as a whole is respectively 2.38 in Italy and 2.40 in Poland. However with more in-depth analysis, a different kind of labour market segmentation that probably involves high inequality of market income is found.

With Italy, one of the main factors of market segmentation is the dissimilar regulatory protection in contracts between standard and non-standard employment. During the last two decades, its EPL index, which refers exclusively to non-standard employment, is steadily worsening (decreased by 60%), while it has been substantially steady for standard employment. In contrast in Poland, the EPL index for the more numerous non-standard employment has doubled during the same period (source: OECD data). In Italy, this process is present within the context of weak efficiency performance shown by its low GDP growth rate and the low ratio of educated workers (as reflected in the PCA).

Historically, the market segmentation in Poland exists between the employed and the unemployed. Nevertheless in Poland during the last ten years, the unemployment rate has decreased significantly, as seen by the diffusion of non-standard contracts and active labour market policies that reduced inequality as recently observed. Moreover, Poland has greater prospects for economic growth that distinguish this country from Italy.

When comparing the results, the anomalous Russian profile is further stressed. As previously noted, the highest inequality level is linked to the highest degree of segmentation in the labour

market and to its profound institutional weakness. These aspects imply that a more appropriate taxonomy can be made regarding European countries and non-European countries.

| Conclusions

This study shows how the labour market is important to define the dynamics of inequality in relation to the distribution of market income as a whole for selected countries among European and transition countries. It also shows that structural and institutional aspects are both strongly relevant factors in income distribution. It is the combination of these different complex dimensions that establishes the degree of inequality in market income among these countries.

In particular, when the institutional and structural dimensions are combined, configuring a "flexsecurity" labour market model (as in Sweden and The Netherlands) or a similar one (as in Sloveniar), they are associated with low market income inequality, given that these models also include the marginal component of labour supply in the labour forces. Instead, when institutional and structural aspects involve a high degree of labour market duality (as in Italy or Poland, even when in relation to different factors), one can observe greater inequality. So the northern European countries' labour market model seems to be the best one to contain economic inequality within those countries.

The last consideration regards the nature of the countries' taxonomy used. Despite the differences detected in the general main findings, it seems more appropriate to make a distinction between "European " and "non-European countries" (only Russia in this research), rather than between "European countries" and "transition countries". The EU additions from the east have increased the distances between the central eastern European countries and the former Soviet Union, causing the taxonomy previously used to be weakened.

| Appendix

Table A1 | **Dataset used for cluster analysis and PCA, selected European countries**

Country	labf_ ed	g_lmp	epl	nonst_em	gdp_gm	un_m	g_ed
France	29.4	0.84	3	14.9	1.84	8.44	5.6
Germany	23.9	0.8	2.63	14.7	1.82	9.56	4.5
Italy	15.7	0.46	2.58	13.3	0.88	7.04	4.3
Netherlands	29.2	1.06	2.23	18.2	2.64	3.84	5.3
Spain	31.8	0.81	3.11	29.3	3.08	9.66	4.3
Sweden	29.8	0.97	2.06	16.1	2.92	6.68	6.6
U.K.	31.9	0.27	1.09	5.4	2.24	5	5.5

Table A2 | Dataset used for cluster analysis and PCA, selected transition countries

Country	labf_ed	g_lmp	epl	nonst_em	gdp_gm	un	g_ed	cpi
Czech Republic	14.4	0.23	2.32	8	5.24	4.4	4.2	5.2
Estonia	33.7	0.07	2.39	2.4	6.34	5.5	4.8	6.6
Hungary	20.6	0.27	2.11	7.9	2.84	7.8	5.2	5.1
Poland	21.5	0.56	2.41	27	5.38	7.1	4.9	4.6
Russia	52.5	0.14	1.8	11	7.1	6.3	3.9	2.1
Slovenia	22.4	0.18	2.76	4.7	5	4.4	5.7	6.7

Variables and sources:

labf_ed: share of educated workers on the total labour force (source: OECD).

g_lmp: government expenditure on active labour market policies with relation to the GDP (source: OECD).

epl: degree of protection afforded by national law to workers. Scale from 0, least restrictions;

6 most restrictions (source: OECD).

nonst_em: share of workers with non-standard contracts to total workers (source: EUROSTAT).

un: unemployment rate as a percentage of total labour force (source: World Development Indicators 2011, World Bank).

g_ed: public expenditure on education with respect to GDP (source: World Development Indicators 2011, World Bank).

gdp_gm: average GDP growth from 2004 to 2008 (source: World Development Indicators 2011, World Bank).

cpi (only in table A2)**:** Corruption Perception Index. Sscale from 0, high corruption perceived;

10 no corruption perceived (source: Transparency International).

Table A3 | Dataset used for cluster analysis and PCA (standardized values), selected European countries

Country	zlabf_ed	zg_lmp	zepl	znonst_em	zgdp_gm	zun_m	zg_ed
France	0.347	0.155	0.898	-0.152	-0.475	0.570	0.522
Germany	-0.601	0.155	0.357	-0.181	-0.501	1.074	-0.775
Italy	-2.015	-0.932	0.284	-0.377	-1.731	-0.060	-1.010
Netherlands	0.313	1.242	-0.228	0.311	0.572	-1.502	0.168
Spain	0.761	0.155	1.059	1.870	1.148	1.120	-1.010
Sweden	0.416	0.880	-0.476	0.016	0.938	-0.223	1.701
U.K.	0.779	-1.656	-1.894	-1.486	0.049	-0.979	0.404

Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

Table A4 | Dataset used for Cluster Analysis and PCA (standardized values), selected transition countries

Country	zlabf_ed	zg_lmp	zepl	znonst_em	zgdp_gm	zun	zg_ed	zcpi
Czech Republic	-0.954	-0.267	0.067	-0.247	-0.053	-1.080	-0.890	0.089
Estonia	0.450	-0.802	0.285	-0.886	0.707	-0.297	0.025	0.924
Hungary	-0.503	0.267	-0.585	-0.259	-1.711	1.341	0.636	0.030
Poland	-0.438	1.871	0.347	1.921	0.044	0.842	0.178	-0.268
Russia	1.818	-0.802	-1.548	0.095	1.232	0.273	-1.348	-1.760
Slovenia	-0.372	-0.267	1.434	-0.624	-0.219	-1.080	1.398	0.984

Source: author's calculation on OECD, EUROSTAT and WDI data using STATA software.

Variables
zlabf_ed: standardized values of *labf_ed*;
zg_lmp: standardized values of *g_lmp*;
zepl: standardized values of *epl*;
znonst_em: standardized values of *nonst_em*;
zgdp_gm: standardized values of *gdp_gm*;
zun: standardized values of *un*;
zg_ed: standardized values of *g_ed*;
zcpi (only in table A4)**:** standardized values of *cpi*.

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