UNIVERSITY
OF TRENTO - Italy

Department of Economics

Dualism and growth in transition economies: a two-sector model with efficient and subsidized enterprises

Luigi Bonatti and Kiryl Haiduk

n.
15/2010

Dualism and growth in transition economies: a two-sector model with efficient and subsidized enterprises

Luigi Bonatti and Kiryl Haiduk

Dualism and growth in transition economies: a two-sector model with efficient and subsidized enterprises

Luigi Bonatti* and Kiryl Haiduk°

ABSTRACT: We develop a two-sector growth model distinguishing between a private sector consisting of profit-making firms and a state-controlled sector consisting of subsidized firms. Both sectors produce the same good. The private sector generates learning-by-doing and technological spillovers, while the state-controlled one is technologically obsolete and 'stagnant'. This distinction allows tracing the dual-economy stage of development observed in transition economies. While in some of them the period in which profit-making and loss-making enterprises coexist was rather brief, some continue to display this pattern because of their industrial legacies and politico-ideological preferences. The model predicts that—*ceteris paribus*—the larger is the initial fraction of the workforce employed in the obsolete sector and the stronger is the degree of ideological hostility towards market forces, the lower is the speed at which a transition economy will converge to the income level of the most advanced countries.

*University of Trento, E-mail: luigi.bonatti@unitn.it
° University of Trento, E-mail: kiryl.haiduk@economia.unitn.it

1. INTRODUCTION

In an economically-globalised world, market-promoting reforms seem to be an imperative for policy-makers. When the former socialist economies entered the world market economy, this thesis looked particularly appealing. It was believed that they had been unsuccessfully experimenting with what has been called a 'state socialist model' whose eventual demise would have paved the way to the unabridged functioning of market forces. At the same time, progress in the process of reform differed across countries, and these differences have persisted (EBRD, 2009) and translated into distinct politico-economic and institutional configurations (Bohle and Greskovits, 2007). Frequently, intellectual endeavours tended to pack reforms into the two boxes: a 'big bang'/'shock therapy' versus a 'gradualist' approach, while leaving some outliers (such as Vietnam and China) beyond that dichotomy (World Bank, 1996). Later, a somewhat more careful classification suggested the existence of in-between cases (e.g. Poland and Czechoslovakia in 1991–1992, Hungary until 1995, and Russia in the 1990s). Indeed, it is nearly impossible to allocate countries between the two poles: all of them have experienced policy changes and reversals so that the transition process(es) have not been uniform at best (Lavigne, 1999, pp. 118–120; Gross and Steinherr, 1995). For instance, a real 'shock therapy' program in Hungary was implemented only in 1995 (and not at the start of transformation), as the right-wing coalition favouring gradualism was superseded by the new government with a different ideological stance towards reforms (Lavigne, 1999, p. 119).

In some countries, reforms stagnated if not came to a halt, reflecting stable political economy coalitions of social actors (Przeworski, 1991; Hellman, 1998; Havrylyshyn and Smee, 2000). The EU membership played an important role: in East-Central European and the Baltic States, the political elites and the populations were driven by the willingness to 'return to normality' (Laux, 2000, p. 268) through fully-fledged EU membership. In contrast, the former Soviet Union

republics have not accepted this goal and continued to be locked-in in-between the manipulated and the market economy, backwardness and modernity. The co-existence of both features in these seemingly unified economies suggests looking at the concept of 'dualism'.

Development economics has accumulated some familiarity with the concept of 'dual economy' (Lewis, 1954; Fei and Ranis, 1961; Hayami and Ruttan, 1971), namely of an economy where a (small) manufacturing sector and a backward (mainly agricultural) sector coexist. The modern sector is typically an enclave operating 'more or less like any modern industrial economy' (Basu, 1997, p. 151), surrounded by a much larger outdated sector, where the modes of production are more primitive. In this context, development has been associated with the expansion of the modern sector and the shrinkage of the traditional (agricultural) sector. However, dualism is not confined to the production alone, but often reflects differences in 'social systems, racial or ethnic backgrounds, demographic behaviour, consumer expenditure and consumer savings behaviour, and the domestic and foreign sectors' (Kelley et al., 1972. p. 8).

For the transition economies, the problem was not industrialisation, but re-industrialisation or even deindustrialisation, and, crucially, the reorganisation of the existing industries in such a way that profit-making and competitiveness considerations could prevail over loss-making and stock-piling activities flourishing under the state socialist system of soft budget constraints (Kornai, 1980). Also in these economies dualism can go beyond the production sphere and affect even the monetary domain. For instance, the economies of the former USSR are all characterised by significant rates of dollarization, namely by the widespread use of a foreign currency coexisting with the domestic currency (Feige and Dean, 2004), while for the new member states of the EU that belonged to the socialist camp the experience of dollarisation was rather short (Haiduk et al., 2004).

It can be argued that a dualistic development is not a specific feature of some individual country, since it has been observed in many transition economies albeit at different periods of time in the course of transformation (Myant, 1993; Nielsen, 1996; Winiecki, 1993). Governments of the

Baltic and the East-Central countries might have been initially enthusiastic about reforms, but have limited the speed of restructuring in order to prevent their economies from sliding into a deep recession. This experience tends to be neglected in the literature on transition with its inclination to conduct the debate "under the misnomer of shock therapy versus gradualism" (Csaba, 2009, p. 385). According to this approach, delays in the reform process are part of gradualism, often seen as reluctance to a needed change observed in the so-called laggard reformers. The latter approximately coincide with those CIS countries that that have managed to follow a dual-economy track for much longer. In the case of these countries, dualism has appeared to be inescapable in the course of the transition process, since (i) the high level of industrialisation inherited from the socialist era made the social costs of restructuring quite severe; (ii) the need to prevent the economy from experiencing mass unemployment in the period necessary to construct a well-functioning market-based coordination mechanism justified the subsidization of selected enterprises or sectors; (iii) the existence of political preferences and public attitudes hostile—or at least not particularly favourable—towards market-oriented reforms obstructed the emergence of a pure market economy.

The case of Belarus is illustrative of such dual-economy track. In the industrial sphere, a sizeable public sector consisting of state-owned enterprises coexists with a relatively small, but viable modern sector comprised of small and medium-sized private companies and petty entrepreneurs (a few export-oriented companies partially controlled by the state and successfully operating in foreign markets can be also included in this dynamic sector). Moreover, ideological factors have played an important role in creating a climate not favourable to massive privatization and in support of the preservation of state controls over the economy.

Looking at the future economic prospects of former Soviet republics like Belarus, one of the core issues is whether a dually-structured economy will be able to grow in the long run at a satisfactory rate, or—if unable to do so—whether it will able to revise the boundaries between the public and the private domain and between profit-generating and loss-making activities. The time

dimension of the problem is also very relevant, since sooner or later the dual structure of the economy is likely to collide with its growth capabilities and its external competitiveness: for how long the functioning of the economy will be considerably affected by the industries and the structures inherited from the socialist past? In this paper, we are concerned with these issues, which motivate the model whereby we formally analyse the growth performance of a typical transition economy characterized by a dual-economy structure.

The paper is organized as follows. Section 2 is dedicated to a quick exploration of the concept of dualism in economic development and to a discussion of how it can be meaningfully applied to the transition economies. Some of the stylized facts that may help understanding the economic performance of the former Soviet republics are discussed in section 3. Section 4 presents the analytical model and section 5 characterizes the equilibrium path of the economy. Section 6 concludes.

2. THE CONCEPT OF DUALISM IN ECONOMIC DEVELOPMENT AND ECONOMIC TRANSITION

A concept of dualism in economic development was originally proposed by Julius Herman Boeke (1953) to study the Indonesian economy and society. A typical dual economy consists of two sectors: a (small) urban-industrial and a (big) rural-agricultural sector. The manufacturing sector displays features of any modern industrial economy, while a much bigger agricultural sector surrounding the advanced one is characterised by a primitive mode of production. As a result, labour market is split into two parts: one is comprised of relatively well-paid and skilled urban workers and the other is full of poorly paid and low-productive rural workers.

The original models (Furnivall, 1948; Boeke, 1953; Jorgenson, 1961) emphasised one single feature of dualism, either behavioural or technological parameter differences between sectors, which produce the single commodity or are characterised by identical demand and demographic

parameters. Later scholars adopted a multidimensional approach and accounted, for instance, for the spatial features (Kelley et al., 1972).

It is widely recognized that Lewis (1954) can be considered a pioneering model of rural-urban migration. In this framework, the backward rural sector is the supplier of cheap labour to the advanced industrial sector. The rapid capital accumulation in industry that drives growth depends on savings. Lewis (1954, p. 155) argues that 'the central problem in the theory of economic development is to understand the process by which a community which was previously saving and investing 4 or 5 percent of its national income or less, converts itself into an economy where voluntary saving is running at about 12 or 15 percent or more' (Lewis, 1954, p. 155). Later, Lewis (1992) explained his inclination towards economic dualism by pointing at a historical puzzle: in Britain, during the first fifty years of the industrial revolution, real wages remained more or less constant while profits and investment were rising. This is against the neoclassical prediction that all three variables should move together. As a matter of fact, Lewis' concept of dual economy is rooted in the classical approach of Smith and Ricardo, according to which there is a virtually 'unlimited supply of labour' that keeps wages low and profits high (Lewis, 1992, p. 397). Still, the debate has remained centred on the labour transfer problem and on the persistence (or shrinking) of the inter-sectoral wage gap in the course of economic development (Basu, 1997).

Ranis and Fei (1964) provided the Lewis model with micro-foundations and reformulated it in a neoclassical fashion by considering the case where unlimited supply of labour is over and the agricultural sector is fully 'commercialised'. Commercialisation of the traditional sector results in the elimination of dualism (Fei and Ranis, 1961; Jorgenson, 1961). Other formulations (Boeke, 1953; Baldwin, 1966; Eckhaus, 1955; Higgins, 1956) considered diminishing—and not disappearing—differences in production conditions through time that result in the mere attenuation of dualism. Higgins (1956, p. 106) argues that dualism cannot fully elapse since 'some degree of dualism exists in virtually every economy. Even the most advanced countries, such as Canada and

the United States, have areas in which techniques lag behind those of the most advanced sectors, and in which standards of economic and social welfare are correspondingly low'. This conception, however, emphasizes the simultaneous presence of well-performing and poorly-performing sectors, reflecting different stages of their development as the economy evolves. In similar vein, contemporary explorations of dualism (Vollrath, 2009; Turnovsky and Basher, 2009; Rada, 2007) stress the existence of factor market inefficiencies that lower the overall productivity and income (Vollrath, 2009), bring about 'the recursive fiscal dilemma' (Turnovsky and Basher, 2009), but without cancelling the possibility of sustainable employment and adequate output and productivity growth (Rada, 2007).

In contrast, we are concerned with the co-existence of sheltered and unsheltered sectors, with the latter 'feeding' the former in a number of ways. In our model, the government intervenes to reallocate value-added collected by taxation from the dynamic sector to the stagnant one. This framework, we believe, adequately captures an important pattern that has characterized most post-Soviet economies in the first years of the transition and that in some countries (such as Belarus) still persists.

Why to approach the analysis of economic transition with the concept of dualism? Fundamentally, we argue that dualism emerged out of the Soviet legacy of heavy industrialisation, and that the choices made over the years by the countries' policy makers explains the different pace at which the inherited economic structure is eroded and is replaced by a more market-oriented economic environment in the various post-Soviet countries. Indeed, nearly all socialist economies were heavily industrialised (Lavigne, 1999). Furthermore, plant sizes were extraordinary large. For instance, in Czechoslovakia, only 1.4 percent of manufacturing workers were employed at enterprises with less than 500 employees as compared to 35 percent in the United States in 1986, 47 percent in West Germany in 1987, 70 percent in Demark in 1987, and 79 percent in Spain in 1987 (Myant, 1993; Nielsen, 1996). In Russia, in 1990, there were only 25,000 small enterprises; if the

U.S. economy were taken as a benchmark, there should have been from 300,000 to 400,000 of such companies (Nielsen, 1996).

Large plant size and high industrial concentration were elements of the attempt to revitalise the socialist industry and to upgrade its competitiveness that took place since the late 1950s, when the Stalinist industrialisation model had exhausted its developmental potential. Other measures included the introduction of plan bargaining (Kornai, 1980), the relaxation of the mandatory character of plans, self-organisation experiments and, in the 1980s, the imports of what was considered as leading technologies from the West (Lavigne, 1999).

The socialist economies were not dual economies since—despite the combination of central planning and market instruments—the private sector was 'almost non-existent in the industrial sector, except in Hungary' (Nielsen, 1996, p. 36). The rapid growth of the private sector started only after the collapse of the socialist bloc, mainly thanks to the diffusion of small and medium-size enterprises (SMEs) (World Bank, 1996). Large existing entities remained a problem. Their closure would have led to mass unemployment and to a very deep recession, since a nascent private sector could not have absorbed redundant workers as quickly as their release would have occurred. Hence, it 'was politically impossible and economically pointless' to tolerate a chain of bankruptcies (Nielsen, 1996, p. 71). In this situation, governments decided to soften budget constraints and postpone privatisation of larger state-owned enterprises. The coexistence of viable private sector of SMEs and unreformed industrial giants led to the emergence of a dualistic structure when the transition unfolded. It was not a dichotomy of rural-agricultural and urban-industrial sectors, but of sheltered and obsolete state-controlled industrial and unsheltered modern private sectors.

The governments of, to mention some cases, Poland and Czechoslovakia (and later Slovakia) delivered 'subsidies, additional credits at least implicitly guaranteed by the state, various kinds of tax relief, and tariff and non-tariff protection' to state-owned enterprises (Van Brabant, 1994, p. 77). It was done in an *ad hoc* manner, in a way divergent from the industrial policy

experience of East Asian tigers, whose application to the former socialist world was considered desirable by the scholars of 'late industrialisation' (Amsden et al., 1994; Wade, 1996). It was not only the lack of resources that made problematic the implementation of such an industrial policy, but also the ideological stance against interventionism in general (Eyal et al., 1997) and the fear of the formation of special interest groups powerful enough to bargain for special treatment (Kaminski and Soltan, 1989; Hausner and Wojtyna, 1993).

While in the model presented here, the modern sector is the source of subsidies channelled to the backward one, in East-Central European economies and in the Baltic States it was the banking sector that played an important role in the support of the old industrial structure. National governments tried to provide subsidies out of their tax revenues, but soon their fiscal deficits prevented them from insisting with this policy (Bonin et al., 2004). Preferential tax treatment were generally given to private firms populating the modern sector (especially in Poland) so as to stimulate their growth (Winiecki, 1993). In addition, there were numerous opportunities for tax evasion. Taking together, all these features assigned a dominant role in keeping obsolete industrial giants afloat to banks, which accumulated bad loans in their portfolios (Sherif et al., 2003).

However, re-softening of budget constraints did not improved the position of large industrial enterprises. Instead, the accumulation of bad loans and the worsening of the fiscal situation forced the governments to reverse the dual-track of development by cutting enterprises from the dropping bottle of explicit and implicit subsidisation. This time the promise had to be credible enough. The solution was the privatisation of the main banks that were sold to their EU counterparts. The Baltic States were the pioneers in this process: the Northern European banks became owners of the Baltic banking sector within 3–4 years from the start of the transition. In East-Central Europe, the Hungarian government finally made a decision on foreign ownership in 1995 (after almost six years of resistance and the costly and painful lessons of multiple recapitalisations) (Mihalyi, 2004), the

Czech and Polish governments followed, and Bulgaria and Romania remained behind for a while (Sobol, 1998).

The continuation of dual-track development would have been a feasible option only if the subsidized enterprises would have been capable of drastically improving their performance (and in general this did not happen), or if the governments would have found additional sources of support. For subsidized enterprises, incentives were an obvious issue: as it is well known, the possibility of being bailed-out creates a moral hazard problem that can undermine competitive efforts. Moreover, the tax systems were not generating enough revenues, and higher tax rates would have suffocated the development of dynamic private SMEs. Finally, banks could have become more vulnerable with more doubtful loans in their portfolios. As Myant (1993, p. 151) correctly describes the situation, 'in the view of the state budget and balance of payments problems, [the dual-track]…strategy depended either on very substantial external aid or on the acceptance of a budget deficit and possibly of some form of stronger restrictions on imports'. These possibilities were against the premises of the reform programs in East-Central Europe.

In contrast, some countries – particularly the former Soviet Union republics – have managed to follow the dual-economy track for a longer period of time. It is not surprising that they have generally been behind the East-Central European and the Baltic countries in terms of large-scale privatisation and enterprise restructuring as routinely measured by the EBRD scores (EBRD, 2009) (see Table 1). One of the paradigmatic cases is Belarus, where a sizeable backward sector of state-owned enterprises still coexists with a small and viable sector of competitive and modern companies, some of which are also controlled by the state. This case would be illustrated below and some of its features are captured by the analytical model developed in the subsequent sections.

Table 1: EBRD indicators of 2009

Country indicator	Large scale privatisation	Small scale privatisation	Enterprise restructuring	Average of three indexes of three, 1996
ALBANIA	3.67	4.00	2.33	3.33
ARMENIA	3.67	4.00	2.33	3.33
AZERBAIJAN	2.00	3.67	2.00	2.56
BELARUS	1.67	2.33	1.67	1.89
BOSNIA AND HERZEGOVINA	3.00	3.00	2.00	2.67
BULGARIA	4.00	4.00	2.67	3.56
CROATIA	3.33	4.33	3.00	3.55
ESTONIA	4.00	4.33	3.67	4.00
FYR MACEDONIA	3.33	4.00	2.67	3.33
GEORGIA	4.00	4.00	2.33	3.44
HUNGARY	4.00	4.33	3.67	4.00
KAZAKHSTAN	3.00	4.00	2.00	3.00
KYRGYZ REPUBLIC	3.67	4.00	2.00	3.22
LATVIA	3.67	4.33	3.00	3.67
LITHUANIA	4.00	4.33	3.00	3.78
MOLDOVA	3.00	4.00	2.00	3.00
MONGOLIA	3.33	4.00	2.00	3.11
MONTENEGRO	3.00	3.67	2.00	2.89
POLAND	3.33	4.33	3.67	3.78
ROMANIA	3.67	3.67	2.67	3.34
RUSSIAN FEDERATION	3.00	4.00	2.33	3.11
SERBIA	2.67	3.67	2.33	2.89
SLOVAK REPUBLIC	4.00	4.33	3.67	4.00
SLOVENIA	3.00	4.33	3.00	3.44
TAJIKISTAN	2.33	4.00	2.00	2.78
TURKEY	3.33	4.00	2.67	3.33
TURKMENISTAN	1.00	2.33	1.00	1.44
UKRAINE	3.00	4.00	2.33	3.11
UZBEKISTAN	2.67	3.33	1.67	2.56

Source: EBRD.

To summarize, the transition process essentially contains a period of dualistic economic development resulting from the socialist pattern of industrialisation and from the natural propensity of politicians to resist socially-painful reforms. The length of this period varies. Its briefness in the case of East-Central European countries, such as Poland, Hungary and Czechoslovakia, can be linked to the fact that the governments of these countries stopped channelling massive resources towards the backward sector, which was slow to adjust to the new economic conditions. The case of

Belarus is different. In contrast with some of its post-Soviet neighbours (see Table 1), this country has made little progress on the way of creating a modern competitive sector. The Baltic states represents a useful benchmark for making comparisons: they share with Belarus the same legacy of having been part of the Soviet Union and they have started the transition process at the same time, but their transition process has been very different. This remains true in the light of the global financial crisis, that has revealed elements of fragility in the Baltic economies, once considered the 'frontrunners of transformation' (Csaba, 2009).

3. THE PERSISTENCE OF DUALISM: STYLIZED FACTS

One of the essential conditions for a dual economy to function is the availability of sufficient resources for redistribution. The latter can take place through the government budget. Belarus has been ahead of other transition economies in terms of the taxes to GDP ratio. In Belarus, between 1994 and 2008, tax revenues accounted on average for 47 percent of GDP, while in the Baltic states the corresponding figure was around 37 percent (see Figure 1).

There are also considerable differences in the principles inspiring the tax systems and in the modes of tax collection.

The structure of taxation reflects the divergent approaches to transition. In the former Soviet Union republics, tax systems are based on taxing enterprises, goods and services, in line with the legacy of an industrial structure of large monopolistic enterprises, coupled with low levels of economic development and no realistic chance of joining the EU. In contrast, the East-Central European countries and the Baltic states diverted from the old socialist pattern of taxation by relying on personal taxes, thus bringing their tax systems in line with those of the West European states' (Gehlbach, 2008).

Differences in the modes of tax collection are also important. The latest World Bank's report 'Paying Taxes-2010' (World Bank, 2010) constructs an index measuring tax systems from the point

of view of a domestic company complying with different laws and regulations. Belarus is placed the last (183rd) among all the countries studied in terms of tax rates, the amount of hours needed for accounting purpose and the number of payments. In Belarus, it is estimated that more than 900 hours per year are spent to calculate and pay taxes (there are 107 different payments a company may be subject to), while the percentage of profit taxed is 99.7 percent. In contrast, for Lithuania, these figures are 166 hours, 12 payments and 42.7 percent of profit, for Latvia 279 hours, 7 payments and 33 percent of profit, and for Estonia 81 hours, 10 payments, and 49.1 percent of profit (World Bank, 2010). Also, in 2009, about 12 percent of all employed in Belarus were accountants (about 400,000 people, while the number of tax inspectors were around 8,000) (Duben, 2010).
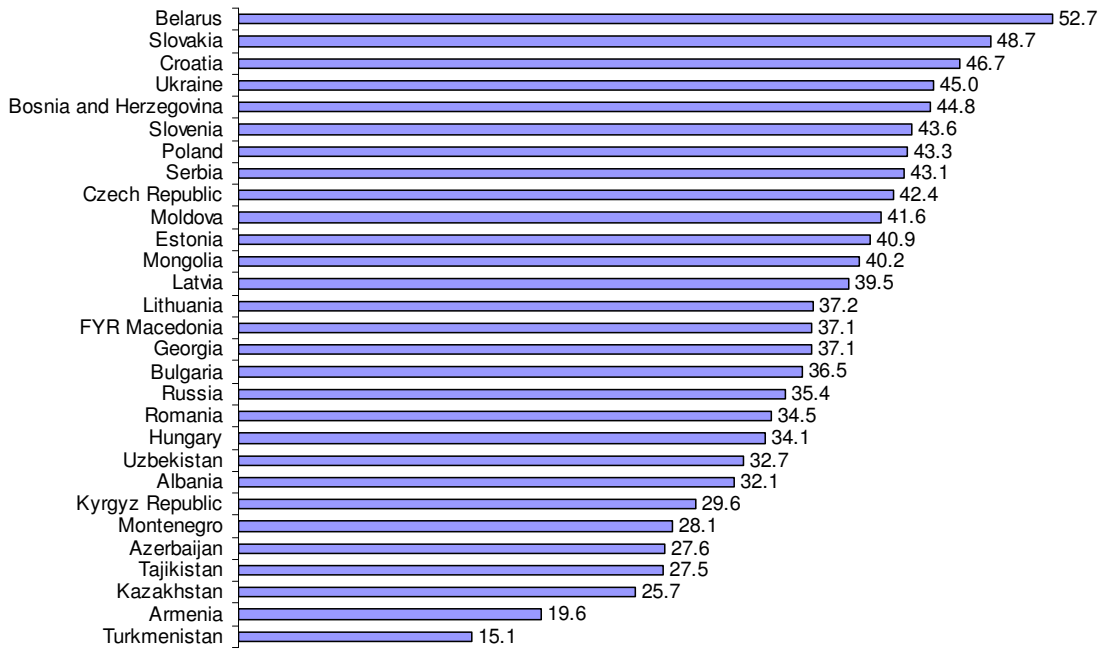

Figure 1: Tax revenues to GDP in the transition economies in 2008
Source: EBRD

Taxation is not the only way to collect funds necessary for subsidies. Support comes in the form of the unequal treatment of private and state-owned companies. An early – but very typical – example is still valid today: in Belarus, in 1996, 143 state-owned enterprises were granted *ad hoc* tax exemptions, notably from the VAT and customs duties, 155 enterprises benefited from tax

deferments, while collective farms were given an opportunity to purchase oil and raw materials with the postponement of payments until the next year (IMF, 1998). There is also pervasive cross-subsidisation as selected state-owned companies pay less for electricity and other utilities.

In Belarus, private companies often encounter corruption. Transparency International (2010) ranks Belarus 127th in its world rating of corruption. According to a survey made among private SMEs (Glambotskaya et al., 2010), about 70 percent of them give bribes. This is a rather stable figure unchanging over a number of years. As for large private firms, about 60 percent of them bribe officials (e.g. sanitary and safety inspectors) on a regular basis. Also, companies are often engaged in indirect corruption schemes, such as kickbacks. Taken together, the confiscatory character of the tax system, bribes and kickbacks represent a burden which represses the development of a dynamic private sector.

How are the tax revenues translated into subsidies and who are their recipients in Belarus? It is difficult to construct a consistent time series since the budgetary classification of expenditures was changed. It is only over the period 1993–1997 that national accounts provide the data on government subsidies. In that period, their average volume amounted to 6.4 percent of GDP. Since 2006 onwards, the national statistical body has calculated the 'expenditures on the national economy'. In 2008, this figure reached 12.8 percent of GDP, or about 26 percent of the government budget. Among other items, it includes the subsidies spent to support loss-making companies.[1]

The IMF provides a number of estimates of quasi-fiscal expenditures spent in order to support sectors and individual enterprises. These expenditures were mainly in the form of directed and subsidised credits of the National Bank, following the instructions of the executive authorities. The quasi-fiscal expenditures were estimated to be 2.5 percent of GDP in 1996 and 3.7 percent in 1997. The IMF reports estimates for later years (IMF, 1999, 2000, 2001), and the figure typically

---

[1] All the data here and thereafter are from various statistical bulletins published by the Ministry of Statistics of Belarus, later transformed into the Belarusian Statistical Committee, or Belstat.

fluctuates around 3 percent of GDP. Although the directed loans from the National Banks were abolished, they have been resurrected in other forms and been channelled through the major state banks financing state investment programs. This practice has been even intensified as a response to the global economic crisis (Kruk and Chubrik, 2010).

A useful insight can be obtained from the analysis of the demand for subsidies in Belarus. Here, recipients are often backward, uncompetitive and loss-making companies. On average, over the period 1994–2008, about 17 percent of enterprises in the economy were loss-making, with total losses amounting approximately to 3.7 percent of GDP. These losses need to be covered, and this figure falls within the range of subsidies that such enterprises may receive. In 2001, about 33 percent of companies were making losses, while these losses amounted to almost 7 percent of GDP.

Further supporting evidence is the existence of sizeable stocks of unsold goods by enterprises. They continue to produce output, thus positively contributing to GDP, but being unable to sell their goods and having troubles with debt repayment and the acquisition of needed amounts of circulating capital. Between 2001 and 2008, the average volume of stocks in industry amounted to 58 percent of total monthly industrial output, or about 3.6 percent of GDP.

Why does the government goes on with a policy of subsidisation that requires an ever-growing volume of resources? Economically, these policies are rather costly and might threaten macroeconomic stability. However, it should not be ignored that taxation and spending are perhaps the most effective economic instruments in the hands of politicians to remain in power. Indeed, politicians' decisions on taxes and subsidies inevitably reflect the effort to reach compromises and to build consensus among the various economic and social groups (Steinmo, 1993; Mares, 2006).

One could claim that the authoritarian polity of the Belarusian government, which maintains control over the economy, may reflect some deep popular preferences (Eke and Kuzio, 2000). In contrast, the populations of the democratic countries in transition might prefer lower degrees of intervention and thus a somewhat 'smaller' state. As a matter of fact, Belarus displayed much

smaller figures of public support for free market institutions than those displayed by, for instance, the Baltic States (see Figure 2). Indeed, even authoritarian governments cannot simply ignore public attitudes and impose their will in a top-down fashion. There is an ample evidence that autocracies hold elections and care about the support of the public (Linz, 2000; Gandhi and Przeworski, 2001; Cox, 2009; Miller, 2009). Furthermore, political business cycles that are typically displayed by democracies (Nordhaus, 1975; Alesina and Roubini, 1997) are also observed in non-democracies (see Magaloni, 2006, for Mexico, and Blaydes, 2008, for Egypt). A wage-based political business cycle is recorded in Belarus,[2] where the government increases wages just before the occurrence of important political events such as referenda and elections. The public support figures tend to closely follow the dynamics of the real wage (see Figure 3).
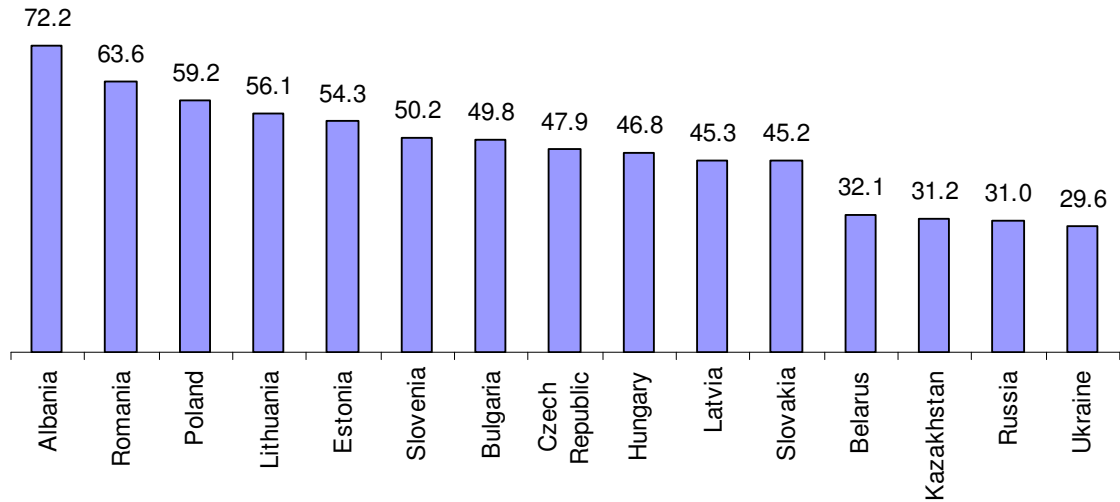

Figure 2: Support for free market institutions, average of 1991–1997

Source: EastEurobarometer, subsequent years.

[2] A wage-driven cycle is possible since the government heavily influences wage determination. In Belarus, wage setting is institutionalized in the form of a 'wage grid', which is a 'tariff system' of the sets of coefficients corresponding to the 27 established ranks of employees. The ratio between the highest and the lowest rank is currently about 7.8. The qualifications for every rank are approved by the Institute of Labour of the Ministry of Labour and Social Protection. The government sets the first-rate tariff, so changes in the first grade automatically affect all other grade levels.

Wages are important because they are the major source of income for the majority of households (Chubrik and Haiduk, 2007). Despite the large public economy, the social policies are not designed to generously support the poor and the unemployed (Chubrik et al., 2009). Unemployment benefits in Belarus remain among the lowest across the transition economies. For instance, in September 2010, this average level of this benefit amounted to about Euro 12 per month, or just 19 percent of the survival wage, which is almost equal to the subsistence minimum. The Household Budget Surveys report even smaller figures: in 1995, the average unemployment benefit was equal to 8.2 percent of the average wage, while in 2008 only to 3.8 percent. In addition, over the years, less than 50 percent of the unemployed has received this scarce benefit, while its duration rarely exceeds six months. In contrast, for example in Lithuania, the benefit level varied from Euro 39 to Euro 72 per month until 2005 (Cazes and Nesporova, 2007), and later increased so as to reach 41 percent of the average wage in 2009 (about Euro 260).
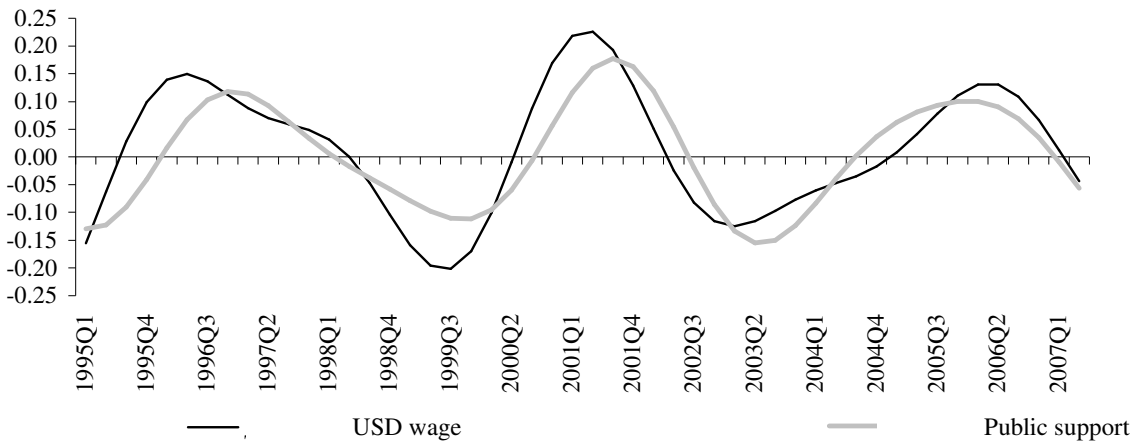

Figure 3: The dynamics of real USD-denominated wages and the popular support in Belarus, 1995–2007

Source: calculations are made on the basis of the data taken from the Belarusian Statistical Committee and the National Bank of Belarus; Black line shows the dynamics of USD-denominated wage, while the grey line depicts the changes in the presidential rating. The rating is calculated as the share of affirmative answers to a question 'Whom would you vote for if the presidential elections are held today?' The survey is conducted by a major independent sociological laboratory, 'Novak' (Minsk, Belarus).

In general, the welfare state in Belarus used to be smaller than in other transition economies, and only in 2005 it slightly exceeded the levels of Latvia and Lithuania (see Figure 4). This is because employment is set to be the priority and the government does not want to destroy productive facilities, apparently hoping that the economy could be reintegrated into the production networks of the former Soviet republics. Indeed, the vast majority of manufacturing exports still falls onto the Russian market (Tochitskaya and Shymanovich, 2009). Some enterprises are clearly supported for the purpose of preventing poverty, especially in the so-called 'mono-towns' built in the former USSR to serve one particular plant (Haiduk et al., 2004). Actually, their closure can mean chronic poverty in a region.
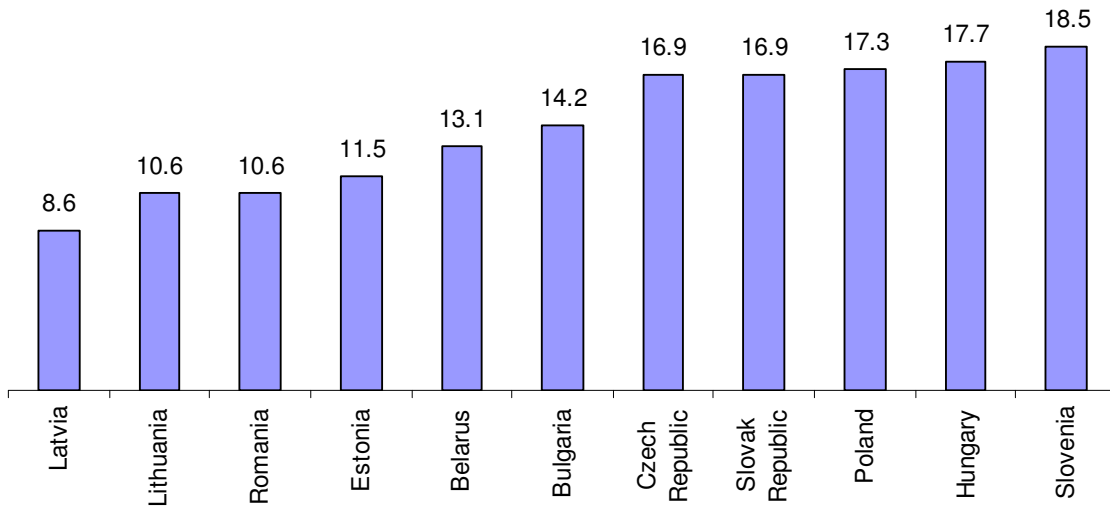

Figure 4: Social expenditures in the selected transition economies

Source: IMF

To summarise, in Belarus the government policies with regard to wage setting and social protection are conducted without considering its inflationary consequences and the inefficiencies brought about by the need to cover losses at the expense of the profit-making privately-owned enterprises. Instead of restructuring obsolete industries and to implement a system of transfers aimed at protecting the unemployed and the poor, the government prefers to subsidize loss-making

enterprises. This approach has worked for a period of time, since the country was able to achieve a satisfactory increase of per capita income and a decent rate of economic growth (see Figure 5), but the arrival of the global economic crisis has revealed the deficiencies that stem from a dual economy, such as the worsening competitiveness due to the lagged modernisation (Kruk and Chubrik, 2009).
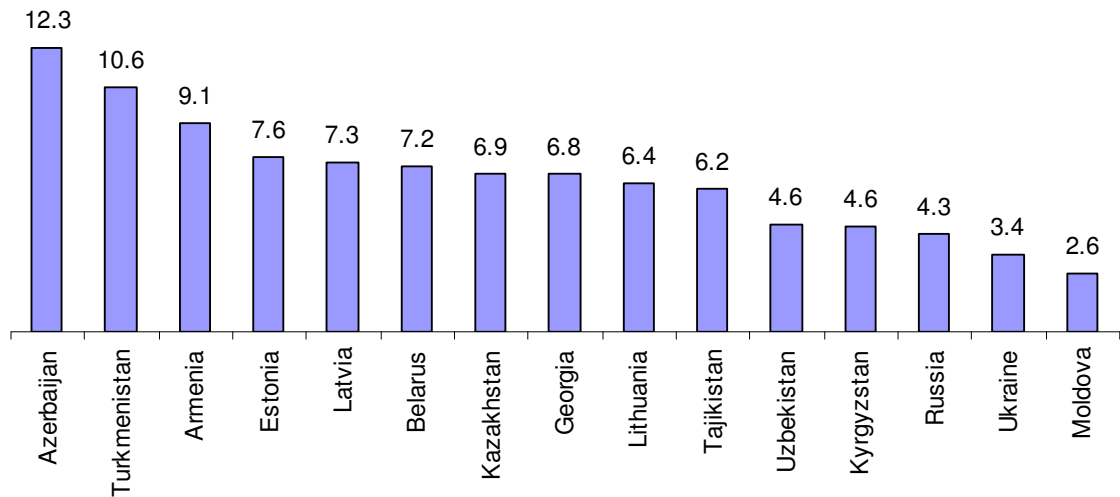

Figure 5: Average growth rates in selected transition economies, 1998 – 2008

Source: EBRD

4. THE MODEL

In the economy under consideration, there is a private sector consisting of profit-maximising firms that are taxed by the government, and a state-controlled sector consisting of firms that are managed in the interest of their employees and are subsidised by the government. This arrangement can be explained by the fact that the workers of the state-controlled firms are a key constituency for the ruling politicians, which are those who appoint the managers of these enterprises and decide on taxation and public subsidies. In this economy, the workers consume entirely their earnings and can be employed in the private or in the state-controlled sector, the investors decide on the fraction of

their income to devote to the accumulation of capital, and the government taxes the private sector for making transfers to the subsidized firms. Both types of firms produce the same product, and this single good can be used both for consumption and for capital investment. The market for this good is perfectly competitive. Also the market in which firms rent the capital that is accumulated by the investors is perfectly competitive. In contrast, the labour market is segmented: workers employed in the state-controlled sector cannot be replaced by outsiders and their wages are set so as to maximise their expected income, while in the private sector wage determination is perfectly competitive. Time is discrete and the time horizon is infinite. Finally, there is no source of random disturbances and agents' expectations are rational (in the sense that they are consistent with the true processes followed by the relevant variables), thus implying perfect foresight.

Profit-maximising firms

There is a large number (normalised to be one) of identical firms that maximise their profits. In each period t, they produce the single good Y_t according to the following technology:

$$Y_{pt} = A_{pt} L_{pt}^{\alpha} K_{pt}^{1-\alpha}, \ 0 < \alpha < 1, \tag{1}$$

where Y_{pt} are the units of good Y_t produced by the private firms, L_{pt} and K_{pt} are, respectively, the labour input and the capital stock used by a private firm to produce Y_{pt}, and A_{pt} is a variable measuring the state of technology of a private firm. It is assumed that A_{pt} is a positive function of the capital installed in the entire private sector of the economy: $A_{pt} = K_{pt}^{\alpha}$.[3] This assumption combines the idea that learning-by-doing works through each firm's capital investment and the idea that knowledge and productivity gains spill over instantly across firms (see Barro and Sala-i-Martin, 1995). Therefore, in accordance with Frankel (1962), it is supposed that although A_{pt} is endogenous

---

[3] Consistently with this formal set-up, one can interpret technological progress as labor augmenting.

to the private sector of the economy, each firm takes it as given, since a single firm's decisions have only a negligible impact on the aggregate stock of capital of the private sector.[4]

In each period t, the representative private firm employs labour and rents capital so as to maximize its net (of taxes) profits, π_{pt}, that are given by

$$\pi_{pt} = (1-\tau_t)Y_{pt} - W_{pt}L_{pt} - R_tK_{pt}, \quad 0 \leq \tau_t < 1, \tag{2}$$

where τ_t is a value-added tax rate, and W_{pt} and R_t are, respectively, the wage rate paid by a private firm and the rental rate on capital. Notice that Y_t is the numéraire of this economy and that its price is normalized to be one.

State-controlled firms

There is a large number (normalised to be one) of identical firms that are controlled and subsidised by the government. In each period t, they produce the single good Y_t according to the following technology

$$Y_{st} = L_{st}^{\beta}K_{st}^{1-\beta}, \quad 0 < \beta < 1, \tag{3}$$

where Y_{st} are the units of good Y_t produced by the state-controlled firms, and L_{st} and K_{st} are, respectively, the labour input and the capital stock used by a state-controlled firm to produce Y_{st}. Notice that total factor productivity is assumed to be time invariant: one may think that in the state-controlled sector there is no incentive to generate productivity gains (no learning-by-doing).[5]

In each period t, the representative state-controlled firm employs labour and rents capital so as to maximise the expected income of its typical employee, p_tW_{st}, where W_{st} is the wage rate paid

---

[4] This amounts to say that technological progress is endogenous to the private sector of the economy, although it is unintended by-products of firms' capital investment rather than the result of purposive R&D efforts.

[5] One may generalise this assumption by stating that even state-controlled firms are able to generate productivity gains, but that they are less effective than private firms in generating them.

by a state-controlled firm, and p_t is the probability of employment in t for a typical employee of a state-controlled firm. This probability is defined by

$$p_t \equiv \begin{cases} \dfrac{L_{st}}{M_t} & \text{if } L_{st} \leq M_t \\ 1 & \text{otherwise,} \end{cases} \tag{4}$$

where M_t are the employees of a state-controlled firm in t (its workforce). The workforce of a state-controlled firm is assumed to coincide with the workers employed by the firm in the previous period who have not retired:

$$M_{t+1} = (1-\eta)L_{st}, \quad 0<\eta<1, \qquad M_0 \text{ given}, \tag{5}$$

where η is the fraction of the workers employed in the state-controlled sector in each period that retire at the end of the period.

The representative state-controlled firm is subject to the following budget constraint:

$$S_t + Y_{st} - W_{st}L_{st} - R_t K_{st} \geq 0, \tag{6}$$

where S_t is the subsidy that a state-controlled firm receives from the government in t.

Investors

There is a large number (normalised to be one) of identical investors. In each t, the representative investor chooses its sequences of consumption $\{C_{In}\}_{n=t}^{\infty}$ and investment $\{I_n\}_{n=t}^{\infty}$ in order to maximize its discounted sequence of utility:

$$\sum_{n=t}^{\infty} \theta^{n-t} \ln(C_{In}), \quad 0<\theta<1, \tag{7}$$

subject to $C_{It} + I_t \leq R_t K_t$ and $K_{t+1} = I_t + K_t(1-\delta), \quad 0<\delta<1, \quad K_0$ given,

where K_t is the investors' stock of capital in t, θ is a time-preference parameter and δ is a capital depreciation parameter.

Government

In each period the government must balance its budget:

$$S_t = \tau_t Y_{pt}.$$ (8)

Since the subsidy per employee of the state-controlled sector $\left(\dfrac{S_t}{M_t}\right)$ tends to diminish with

M_t, while it is plausible that the pressure exerted on the political authorities by the employees of the

state-controlled sector tends to increase with their number M_t, it is reasonable to model the tax rate

whereby the government finances the subsidies in favour of the state-controlled firms as an

increasing function of M_t:

$$\tau_t = f(M_t, \gamma), \ \gamma > 0, \ f_{M_t} > 0, \ f_\gamma > 0, \ f_{M_t \gamma} > 0, \ f(0, \gamma) = 0.$$ (9)

The parameter γ captures the propensity of the political system to favour the state-controlled sector

relatively to the private sector, which depends on values, ideologies (preferences for market

reforms…). In particular, the impact of a larger M_t on τ_t tends to be stronger whenever γ is greater.

A possible functional specification consistent with (9) is the following:

$f(M_t, \gamma) = \gamma \left[\dfrac{M_t}{N} - \dfrac{1}{2} \left(\dfrac{M_t}{N} \right)^2 \right]$, $M_t < N$ and $0 < \gamma \leq 1$, where N is the size of the entire working

population (for simplicity, it is assumed to remain fixed in time).

Markets equilibrium

Equilibrium in the market for the single good requires

$$C_{Wt} + C_{It} + I_t = Y_{pt} + Y_{st},$$ (10)

where C_{Wt} is workers' consumption in t (the workers consume entirely their earnings).

Equilibrium in the private segment of labour market requires

$$L_{pt} = N - M_t.$$ (11)

Equilibrium in the capital market requires

$$K_{pt}+K_{st}=K_t. \tag{12}$$

5. THE EQUILIBRIUM PATH OF THE ECONOMY

Solving the agents' optimization problems, we obtain the equations that—together with the market-equilibrium conditions (10)-(12)—must be satisfied along an equilibrium path:

$$W_{pt} = \alpha[1 - f(M_t, \gamma)]K_{pt}L_{pt}^{\alpha-1}, \tag{13}$$

$$R_t = (1 - \alpha)[1 - f(M_t, \gamma)]L_{pt}^{\alpha}, \tag{14}$$

$$W_{st} = \frac{f(M_t, \gamma)K_{pt}L_{pt}^{\alpha} + K_{st}^{1-\beta}M_t^{\beta} - R_t K_{st}}{M_t}, \tag{15}$$

$$R_t = (1 - \beta)K_{st}^{-\beta}M_t^{\beta}, \tag{16}$$

$$L_{st}=M_t, \tag{17}$$

$$\frac{\theta[R_{t+1} + 1 - \delta]}{R_{t+1}K_{t+1} - I_{t+1}} = \frac{1}{R_t K_t - I_t}, \tag{18}$$

$$K_{t+1}=I_t+K_t(1-\delta), \tag{19}$$

$$M_{t+1} = M_t(1 - \eta), \tag{20}$$

Equations (13) and (14) give us the optimality conditions of a private firm with respect to, respectively, the choice of labour and the choice of capital. Equation (15) is derived from the budget constraint of a state-controlled firm. Equations (16) and (17) are derived from the solution of the optimization problem of a state-controlled firm (see the Appendix to check that it is always optimal for a state-controlled firm to employ its entire workforce). Equation (18) is derived from the Euler equation that we obtain from the solution of the investor's optimisation problem (see the Appendix). Equations (19) and (20) give us the laws of motion of, respectively, the capital stock and the workforce of the state-controlled sector.

Using (11), (14) and (17)-(20), one can obtain the two difference equations in M_t and

$Z_t \equiv \dfrac{I_t}{K_t}$ that govern the equilibrium path of the economy:

$$\Lambda(M_{t+1}, M_t) = M_{t+1} - M_t(1 - \eta) = 0, \tag{21}$$

$$\Gamma(M_{t+1}, Z_{t+1}, M_t, Z_t) =$$
$$= \frac{\theta\{(1 - \alpha)[1 - f(M_{t+1}, \gamma)](N - M_{t+1})^\alpha + 1 - \delta\}}{(1 - \alpha)[1 - f(M_{t+1}, \gamma)](N - M_{t+1})^\alpha - Z_{t+1}} - \frac{1 + g(Z_t)}{(1 - \alpha)[1 - f(M_t, \gamma)](N - M_t)^\alpha - Z_t} = 0, \tag{22}$$

where $g(Z_t) = Z_t - \delta = \rho_t \equiv \dfrac{K_{t+1} - K_t}{K_t}$. [6]

Given (21)-(22), one can easily demonstrate the following proposition concerning long-run growth in this economy:

Proposition 1 The asymptotic rate of real GDP growth depends neither on the initial size of the workforce employed in the state-controlled sector nor on the propensity of the political system to favour this sector relatively to the private sector, but only on the structural parameters of the economy.

Proof By inspecting (21), one can immediately check that along an equilibrium path $\lim\limits_{t \to \infty} M_t = M = 0$, thus entailing: $\lim\limits_{t \to \infty} L_{pt} = N$ (see equation (11)), $\lim\limits_{t \to \infty} R_t = R = (1 - \alpha)N^\alpha$ (see equation (14)), $\lim\limits_{t \to \infty} K_{st} = K_s = 0$ (consider that $R = (1 - \alpha)N^\alpha$ and see equation (16)), $\lim\limits_{t \to \infty} Y_{st} = Y_s = 0$ (consider that M=0 and K_S=0, and see equations (3) and (17)). Hence, if $Z_t \to Z$ as $t \to \infty$, equation (22) reduces to $\theta[(1 - \alpha)N^\alpha + 1 - \delta] = 1 + Z - \delta$ as $t \to \infty$, thus giving

---

[6] Notice that equation (22) can be obtained by using (11), (14) and (17) to rewrite (18) as

$$\frac{\theta\{(1 - \alpha)[1 - f(M_{t+1}, \gamma)](N - M_{t+1})^\alpha + 1 - \delta\}}{K_{t+1}\{(1 - \alpha)[1 - f(M_{t+1}, \gamma)](N - M_{t+1})^\alpha - Z_{t+1}\}} = \frac{1}{K_t\{(1 - \alpha)[1 - f(M_t, \gamma)](N - M_t)^\alpha - Z_t\}}, \text{ and by exploiting the fact}$$

that equation (19) can be rewritten as $\dfrac{K_{t+1}}{K_t} = 1 + g(Z_t)$.

$$Z = \lim_{t \to \infty} Z_t = \theta(1-\alpha)N^{\alpha} - (1-\theta)(1-\delta). \tag{23}$$

Therefore, if $Z_t \to Z$ as $t \to \infty$, one has $\lim_{t \to \infty} \dfrac{Y_{t+1} - Y_t}{Y_t} = \lim_{t \to \infty} \dfrac{K_{t+1} - K_t}{K_t} = g(Z) = Z - \delta$, where Z

is given by (23) and depends neither on M_0 nor on γ, but only on α, δ, θ and N.

An implication of Proposition 1 is that economies sharing the same structural features, but differing because of the relative size of their state-controlled sector and of the propensity of their political system to protect the employees of the state-controlled enterprises, should converge in the very long run to the same growth rate.

For studying the transitional path along which the economy moves from period 0 onwards, we linearise the system (21)-(22) around $\left(M = 0, Z = \theta(1-\alpha)N^{\alpha} - (1-\theta)(1-\delta)\right)$. The linearised system thus obtained has only one trajectory converging to $\left(M = 0, Z = \theta(1-\alpha)N^{\alpha} - (1-\theta)(1-\delta)\right)$, which is governed by (see the Appendix for the derivation)

$$M_t = M_0(1-\eta)^t, \tag{24}$$

$$Z - Z_t = \frac{M_0[1-\theta(1-\eta)](1-\alpha)(N^{\alpha} f_{M_t} + \alpha N^{\alpha-1})(1-\eta)^t}{\theta^{-1} - 1 + \delta}, \tag{25}$$

where $Z = \theta(1-\alpha)N^{\alpha} - (1-\theta)(1-\delta)$ and the partial derivative f_{M_t} is evaluated at $\left(M = 0, Z = \theta(1-\alpha)N^{\alpha} - (1-\theta)(1-\delta)\right)$.

Given (24)-(25), the following proposition holds:

Proposition 2 Along the transitional path, the rate of investment is lower if the initial size of the workforce employed in the state-controlled sector is larger (larger M_0) and/or if the political system has a more accentuated ideological propensity to protect the employees of the state-controlled sector (greater γ).

Proof By considering equations (23) and (25), one can easily check that $\dfrac{\partial Z_t}{\partial M_0} < 0$ and $\dfrac{\partial Z_t}{\partial \gamma} < 0$

(recall that $f_{M_t \gamma} > 0$).

Proposition 2 reflects the fact that in this economy everything that induces the policy makers to devote more resources to subsidise the state-controlled enterprises tends to depress the incentive to invest: it is only in the very long run (i.e., when the influence of the interests connected to the state-controlled enterprises on the policy makers has faded away) that M_0 and γ do not exert any downward effect on capital investment and growth.

6. CONCLUSION

In some transition economies, the legacy of the state-controlled heavy industries has fed the propensity to experiment with a re-softening of budget constraints. In particular, this paper suggests that the experience of the transition economies can be productively understood in terms of dualistic development. In these dual economies, an obsolete sector of state-controlled—often loss-making—enterprises coexists along with a viable sector of relatively efficient, competitive firms providing tax revenues that the government utilize to subsidy the loss-makers. This pattern has a political backing: politicians are reluctant to restructure due to their propensity to protect the employees of the obsolete state-controlled enterprises and to their ideological preferences over the depth of market reforms. In other words, the policy makers have capitalised on the public concern for job security, and converted this concern into a broader unreceptiveness towards neo-liberal reforms. Some countries have moved away from this trajectory rather quickly (the advanced reformers, especially Poland and the Czech Republic), while others (a number of former Soviet Union republics, and particularly Belarus) have not (yet) diverted from this path.

The model presented here shows that, in those economies where the policy makers are particularly concerned with the protection of the obsolete state-controlled enterprises, capital

investment and economic growth are dampened along the transitional path. Determinants of the policy makers' attitudes towards the state-controlled industries are the fraction of the entire workforce that is employed in these industries and their ideological orientation with respect to the neo-liberal reforms. Therefore, the model predicts that—*ceteris paribus*—the larger is the initial share of the workforce that is employed in the obsolete sector and the stronger is the degree of ideological hostility towards a pure market economy widespread in the population, the lower is the speed at which a transition economy will converge to the income level of the most advanced countries.

References

Alesina, A. Roubini, N., and Cohen, G. (1997), *Political Cycles and the Macroeconomy*, Cambridge, MA: The MIT Press.

Amsden, A., Kochanovicz, J. and Taylor, L. (1994), *The Market Meets Its Match: Restructuring the Economies of Eastern Europe*, Cambridge, MA: Harvard University Press.

Baldwin, R.E. (1966) *Economic Development and Export Growth: A Study of Northern Rhodesia, 1920–1960*, Los Angeles: University of California Press.

Barro, R.J. and Xavier Sala-i-Martin, X. (1995), *Economic Growth,* New York: McGraw-Hill.

Basu, K. (1997), *Analytical Development Economics: The Less Developed Economy Revised*, Cambridge, MA: MIT Press.

Blaydes, L. (2008), *Authoritarian Elections and Elite Management: Theory and Evidence from Egypt*, Working Paper.

Bohle, D. and Greskovits, B. (2007), 'Neoliberalism, Embedded Neoliberalism, and Neocorporatism: Towards Transnational Capitalism in Central-Eastern Europe', *West European Politics*, Vol. 30, No.3, May 2007: 443–466.

Boeke, J.H. (1953), *Economics and Economic Policy of Dual Societies*, New York: Institute of Pacific Relations.

Bonin, J., Hasan, I. and Wachtel, P. (2004), 'Bank Performance, Efficiency, and Ownership in Transition Countries', *BOFIT Discussion Papers*, No. 7, Institute for Economies in Transition, Bank of Finland.

Cazes, S. and Nesporova, A. (2007), *Flexicurity: A Relevant Approach in Central and Eastern Europe*, Geneva: ILO

Chubrik, A. and Haiduk, K. (2007), *Rost v polzu bednyh? Factory, opredelyauschie dinamiku blagosostoyaniya naseleniya Belarusi*, Working Paper of the IPM Research Center, No.2, http://www.research.by/pdf/wp2007r02.pdf. Accessed April 17, 2010.

Chubrik, A., Haiduk, K., Pelipas, I. and Rakova, E. (2009), *Social Protection and Social Inclusion in Belarus*, Report prepared for the European Commission, http://ec.europa.eu/ social/main.jsp?langId=en&catId=89&newsId=662. Accessed June 05, 2010.

Cox, G.W. (2009) *Authoritarian Elections and Leadership Succession, 1975 – 2004*, Paper prepared for the 2009 Annual Meeting of the American Political Science Association, September 3–6, 2009.

Csaba, L. (2009), 'From Sovietology to Neo-Institutionalism', *Post-Communist Economies*, 21, No.4: 383–398.

Duben, V. (2010) 'Kolichestvo Nalogovyih Plateszei v Belarusi v 53 raza bol'she, chem. V Shvetsii', *Finansovyi Direktor*, March 16, 2010, http://www.profmedia.by/pub/fin/news/ detail.php?ID=39093. Accessed August 20, 2010.

EBRD (2009), *Transition Report*, London: Oxford University Press.

Eckhaus, R.S. (1955) 'The Factor Proportions Problem in Underdeveloped Areas', *American Economic Review*, No. 45 (September 1955), pp. 539–565.

Eke, S. M. and Kuzio, T. (2000), 'Sultanism in Eastern Europe: The Socio-Political Roots of Authoritarian Populism in Belarus', *Europe-Asia Studies*, 52: 523–547.

Fei, J.S. and Ranis, G. (1964) 'A Theory of Economic Development', *American Economic Review*, 51: 533–565.

Feige, E.L. and Dean, J.W. (2004) 'Dollarization and Euroization in Transition Countries: Currency Substitution, Asset Substitution, Network Externalities, and Irreversibility', *Monetary Unions and Hard Pegs: Oxford Scholarship Online Monograph*, March 2004: 303–321.

Frankel, M. (1962), "The Production Function in Allocation and Growth: A Synthesis," *American Economic Review* 52: 995-1022.

Furnivall, J.S. (1948) *Colonial Policy and Practice*, Cambridge: Cambridge University Press.

Gandhi, J. and Przeworski, A. (2001), 'Authoritarian Institutions and the Survival of Autocrats', *Comparative Political Studies*, Vol. 40, No.11, November, pp. 1279–1301.

Gehlbach, S. (2008), *Representation through Taxation: Revenue, Politics, and Development in Post-Communist States*, Cambridge, MA: Cambridge University Press.

Glambotskaya, A., Rakova, E. and Skriba, A. (2010), *Belarusian Business 2010: Status, Trends, Perspectives,* Minsk: IPM Research Center.

Gross, D. and Steinherr, A. (1995), *Winds of Change: Economic Transition in Central and Eastern Europe*, London: Longman.

Haiduk, K., Herr, H., Lintovskaya, T., Parchevskaya, S., Priewe, J. and Tsiku, R. (2004), *The Belarusian Economy at a Crossroads*, Moscow: Actrav.

Havrylyshyn, O. and Smee, J. (2000), 'Political economy of Stalled Reforms', *Finance and Development*, Vol. 37, No. 3: 7–10.

Hausner, J. and Wojtyna, A. (1993), 'Evolution of Interest Representation in Poland', in Sjostrand, S-E. (ed.) *Institutional Change: Theory and Empirical Findings*, Armonk, N.Y.: M.E. Sharpe: 339–350.

Hayami, Y. and Ruttan, V.W. (1971), *Agricultural Development: An International Perspective*, Baltimore: John Hopkins Press.

Hellman, J. (1998) 'Winners Take All: The Politics of Partial Reform in Post-Communist Transitions', *World Politics*, Vol. 50, No.2: 203–234.

Higgins, B.J. (1956) 'The 'Dualistic Theory' of Underdeveloped Areas', *Economic Development and Cultural Change*, No.4 (January 1956), pp. 99-115.

Jorgenson, D.W. (1961) 'The Development of a Dual Economy', *Economic Journal*, No. 71 (June 1961), pp. 309–334.

IMF (1998) Republic of Belarus: Recent Economic Developments, *IMF Staff Country Report*, No. 98/108, October 1998, Washington, D.C.

IMF (1999), Republic of Belarus: Recent Economic Developments, *IMF Staff Country Report*, No. 99/143, December 1999, Washington, D.C.

IMF (2000), Republic of Belarus: Recent Economic Developments, *IMF Staff Country Report* No.00/153, November 2000, Washington, D.C.

IMF (2002), Republic of Belarus: Recent Economic Developments, *IMF Staff Country Report* No.02/22, February 2002, Washington, D.C.

Kaminski, B. and Soltan, K. (1989) 'The Evolution of Communism', International Political Science Review, Vol. 10, No.4, pp. 371–391.

Kelley, A.C., Williamson, J.G. and Cheetham, R.J. (1972) *Dualistic Economic Development: Theory and History*, Chicago and London: University of Chicago Press.

Kornai, J. (1980), *The Socialist System*, Princeton: Princeton University Press.

Kruk, D. and Chubrik, A. (2009), 'Perspectives and Challenges for Economic Policy in Belarus During the Global Crisis: Evidence from Macro-econometric Modelling', *German Economic Team in Belarus and IPM Research Centre Policy Papers*, Policy Paper PP/04/2009, http://research.by/pdf/pp2009e04.pdf. Accessed June 05, 2010.

Lavigne, M. (1999), *The Economics of Transition: From Socialist Economy to Market Economy*, Basingstoke: Palgrave, 2nd edition.

Laux, J.K. (2000), 'The Return to Europe: The Future Political Economy of Eastern Europe', in Stubbs, R. and Underhill, G.R.D. (eds) *Political Economy and the Changing Global Order*, Ontario: Oxford University Press: 264–273.

Lewis, W.A. (1954), 'Economic Development with Unlimited Supplies of Labour', *The Manchester School of Economic and Social Studies*, May 1954.

Lewis, W.A. (1992), 'Autobiography', in Lindbeck, A. (ed.) *Nobel Lectures: Economic Sciences 1969 –1980*, Singapore: World Scientific Publishing.

Linz, J.J. (2000), *Totalitarian and Authoritarian Regimes*, Boulder, CO: Lynne Riener Publishers.

Magaloni, B. (2006), *Voting for Autocracy: Hegemonic Party Survival and its Demise in Mexico*, Cambridge, MA: Cambridge University Press.

Mares, I. (2006), *Taxation, Wage Bargaining, and Unemployment*, Cambridge, MA: Cambridge University Press.

Mihalyi, P. (2004), 'Growing Irrelevance of Corporate Governance', in Dabrowski, M., Slay, B. and Neneman, J. (eds) *Beyond Transition: Development Perspectives and Dilemmas*, Aldershot, Hants: Ashgate: 203–219.

Miller, M.K. (2009), *Electoral Authoritarianism and Democracy: A Formal Model of Regime Transitions*, Prepared for delivery at the 2009 Annual Meeting of the American Political Science Association, September 3–6, 2009.

Myant, M. (1993), *Transforming Socialist Economies: The Case of Poland and Czechoslovakia*, Aldershot: Edward Elgar.

Nielsen, K. (1996), 'Industrial Policy or Structural Adjustment? A Case of Planned versus Creeping Institutional Change', in Campbell, J.L. and Pedersen, O.K. (eds) *Legacies of Change: Transformations of Post-communist European Economies,* New York: Aldine de Gruyter.

Nordhaus, W. (1975), 'The Political Business Cycle', *Review of Economic Studies*, No. 42, pp. 169–190

Przeworski, A. (1991), *Democracy and the Market: Political and Economic reforms in Eastern Europe and Latin America*, Cambridge, UK: Cambridge University Press.

Rada, C. (2007), 'A Growth Model for a Two-Sector Economy with Endogenous Productivity', *DESA Working Paper*, No. 44, July 2007.

Ranis, G. and Fei, J. (1964), *Development of the Labour Surplus Economy: Theory and Practice*, Homewood: Richard D. Irwin for the Economic Growth Center, Yale University.

Sherif, K., Borish, M., and Gross, A. (2003), State-*Owned Banks in the Transition: Origins, Evolution, and Policy Responses*, Washington, D.C.: The World Bank.

Sobol, D.M. (1998), Central and Eastern Europe: Financial Markets and Private Capital Flows', in Kahler, M. (ed.) *Capital Flows and Financial Crises*, Ithaca and New York: Cornell University Press: 186–228.

Steinmo, S. (1993), *Taxation and Democracy: Swedish, British, and American Approaches to Financing the Modern State*, New Haven: Yale University Press.

Tochitskaya, I. and Shymanovich, G. (2009), 'Foreign Trade of Belarus: Major Challenges and the Ways to Address Them', *IPM Discussion Paper*, DP/09/04.

Transparency International (2010), *Corruption Perceptions Index*, http://www.transparency.org/ policy_research/surveys_indices/cpi/2010. Accessed October 10, 2010.

Turnovsky, S. and Basher, M. (2009), 'Fiscal Policy and the Structure of Production in a Two-Sector Developing Economy', *Journal of Development Economics*, 88: 205–216.

Van Brabant, J. (1994), *The Transformation of Eastern Europe: Joining the European Integration Movement*, Commack, N.Y.: Nova Science Publishing.

Vollrath, D. (2009), 'How Important Are Dual-Economy Effects for Aggregate Productivity?', *Journal of Development Economics*, 88: 325–334.

Wade, R. (1996), 'Reforms in Eastern Europe: Lessons from the East Asian Capitalist Model', in Hersh, J. and Schmidt, J. D. (eds) T*he Aftermath of 'Real Existing Socialism in Eastern Europe*, Vol. 1, London: Macmillan: 165–180.

Winiecki, J. (1993) *Post-Soviet Type Economies in Transition*, Aldershot: Avebury.

World Bank (1996), *World Development Report 1996: From Plan to Market*, Washington, D.C.: The World Bank.

World Bank (2010), *Paying Taxes-2010: The Global Picture*, www.doingbusiness.org/taxes. Accessed July 20, 2010.

APPENDIX

Solution of the optimization problem of the representative state-controlled firm

By using (3) ad (6), the problem of the representative state-controlled firm can be rewritten as

$$\max_{K_{st},L_{st}} p_t W_{st}, \text{ where } W_{st} = \frac{S_t + K_{st}^{1-\beta}L_{st}^{\beta} - R_t K_{st}}{L_{st}} \text{ and } p_t \text{ is given by (4).}$$

The first-order condition for a maximum with respect to the choice of K_{st} is $\dfrac{\partial p_t W_{st}}{\partial K_{st}} = 0$, which entails

$(1-\beta)K_{st}^{-\beta}L_{st}^{\beta} = R_t$. In its turn, $(1-\beta)K_{st}^{-\beta}L_{st}^{\beta} = R_t$ implies that

$$\left.\frac{\partial p_t W_{st}}{\partial L_{st}}\right|_{L_{st} > M_t} = \frac{\beta K_{st}^{1-\beta}L_{st}^{\beta-1}}{L_{st}} - \left[\frac{S_t + K_{st}^{1-\beta}L_{st}^{\beta} - R_t K_{st}}{L_{st}^2}\right] < 0. \tag{A1}$$

One can also check that

$$\left.\frac{\partial p_t W_{st}}{\partial L_{st}}\right|_{L_{st} \leq M_t} = \frac{\beta K_{st}^{1-\beta}L_{st}^{\beta-1}}{M_t} > 0. \tag{A2}$$

Given (A1) and (A2), it is necessarily the case that only $L_{st}=M_t$ maximizes $p_t W_{st}$.

Solution of the optimisation problem of the representative investor

The intertemporal problem of the representative investor can be solved by maximising

$$\sum_{t=0}^{\infty} \theta^t \left\{\ln(R_t K_t - I_t) - \lambda_t[K_{t+1} - I_t - (1-\delta)K_t]\right\} \text{ with respect to } I_t, K_{t+1} \text{ and the Lagrange multiplier } \lambda_t, \text{ and}$$

then by eliminating λ_t, thus obtaining (18) and (19). An optimal path must also satisfy the transversality condition

$$\lim_{t\to\infty} \frac{\theta^t K_t}{R_t K_t - I_t} = 0. \tag{A3}$$

Derivation of the linearised system (24)-(25)

By linearising the system (21)-(22) around $\left(M = 0, Z = \theta(1-\alpha)N^{\alpha} - (1-\theta)(1-\delta)\right)$, one can obtain:

$$\begin{bmatrix} - M_{t+1} \\ Z - Z_{t+1} \end{bmatrix} = \begin{bmatrix} 1 - \eta & 0 \\ [1 - \theta(1 - \eta)](1 - \alpha)(N^{\alpha} f_{M_t} + \alpha N^{\alpha-1}) & \theta^{-1} \end{bmatrix} \begin{bmatrix} - M_t \\ Z - Z_t \end{bmatrix},$$ from which one can compute the

eigenvalues $\omega_1 = 1 - \eta$ and $\omega_2 = \theta^{-1}$, where $0 < \omega_1 < 1$ and $\omega_2 > 1$ (saddle-path stability). By using the

eigenvectors $\begin{bmatrix} e_{11} \\ e_{21} \end{bmatrix} = \begin{bmatrix} \dfrac{(1 - \eta - \theta^{-1})Q}{[1 - \theta(1 - \eta)](1 - \alpha)(N^{\alpha} f_{M_t} + \alpha N^{\alpha-1})} \\ Q \end{bmatrix}$, where Q is a constant whose value has to be

determined, one can find the system governing the saddle path:

$$- M_t = \frac{(1 - \eta - \theta^{-1})Q(1 - \eta)^t}{[1 - \theta(1 - \eta)](1 - \alpha)(N^{\alpha} f_{M_t} + \alpha N^{\alpha-1})}, \tag{A4}$$

$$Z - Z_t = Q(1 - \eta)^t. \tag{A5}$$

By setting t=0 in equation (A4), one can use the initial condition M_0 to compute:

$$Q = \frac{M_0[1 - \theta(1 - \eta)](1 - \alpha)(N^{\alpha} f_{M_t} + \alpha N^{\alpha-1})}{\theta^{-1} - 1 + \eta}. \tag{A6}$$

Finally, by using (A6) for substituting Q in (A4)-(A5), one obtains (24)-(25).

Elenco dei papers del Dipartimento di Economia
pubblicati negli ultimi due anni

2008.1 *A Monte Carlo EM Algorithm for the Estimation of a Logistic Auto-logistic Model with Missing Data,* by Marco Bee and Giuseppe Espa.

2008.2 *Adaptive microfoundations for emergent macroeconomics*, Edoardo Gaffeo, Domenico Delli Gatti, Saul Desiderio, Mauro Gallegati.

2008.3 *A look at the relationship between industrial dynamics and aggregate fluctuations*, Domenico Delli Gatti, Edoardo Gaffeo, Mauro Gallegati.

2008.4 *Demand Distribution Dynamics in Creative Industries: the Market for Books in Italy*, Edoardo Gaffeo, Antonello E. Scorcu, Laura Vici.

2008.5 *On the mean/variance relationship of the firm size distribution: evidence and some theory*, Edoardo Gaffeo, Corrado di Guilmi, Mauro Gallegati, Alberto Russo.

2008.6 *Uncomputability and Undecidability in Economic Theory*, K. Vela Velupillai.

2008.7 *The Mathematization of Macroeconomics*: *A Recursive Revolution*, K. Vela Velupillai.

2008.8 *Natural disturbances and natural hazards in mountain forests: a framework for the economic valuation*, Sandra Notaro, Alessandro Paletto

2008.9 *Does forest damage have an economic impact? A case study from the Italian Alps,* Sandra Notaro, Alessandro Paletto, Roberta Raffaelli.

2008.10 *Compliance by believing: an experimental exploration on social norms and impartial agreements,* Marco Faillo, Stefania Ottone, Lorenzo Sacconi.

2008.11 *You Won the Battle. What about the War? A Model of Competition between Proprietary and Open Source Software*, Riccardo Leoncini, Francesco Rentocchini, Giuseppe Vittucci Marzetti.

2008.12 *Minsky's Upward Instability: the Not-Too-Keynesian Optimism of a Financial Cassandra,* Elisabetta De Antoni.

2008.13 *A theoretical analysis of the relationship between social capital and corporate social responsibility: concepts and definitions,* Lorenzo Sacconi, Giacomo Degli Antoni.

2008.14 *Conformity, Reciprocity and the Sense of Justice. How Social Contract-based Preferences and Beliefs Explain Norm Compliance: the Experimental Evidence,* Lorenzo Sacconi, Marco Faillo.

2008.15 *The macroeconomics of imperfect capital markets. Whither saving-investment imbalances?* Roberto Tamborini

2008.16 *Financial Constraints and Firm Export Behavior*, Flora Bellone, Patrick Musso, Lionel Nesta and Stefano Schiavo

2008.17 *Why do frms invest abroad? An analysis of the motives underlying Foreign Direct Investments Financial Constraints and Firm Export Behavior*, Chiara Franco, Francesco Rentocchini and Giuseppe Vittucci Marzetti

2008.18 *CSR as Contractarian Model of Multi-Stakeholder Corporate Governance and the Game-Theory of its Implementation*, Lorenzo Sacconi

2008.19 *Managing Agricultural Price Risk in Developing Countries*, Julie Dana and Christopher L. Gilbert

2008.20 *Commodity Speculation and Commodity Investment*, Christopher L. Gilbert

2008.21 *Inspection games with long-run inspectors*, Luciano Andreozzi

2008.22 *Property Rights and Investments: An Evolutionary Approach*, Luciano Andreozzi

2008.23 *How to Understand High Food Price*, Christopher L. Gilbert

2008.24 *Trade-imbalances networks and exchange rate adjustments: The paradox of a new Plaza*, Andrea Fracasso and Stefano Schiavo

2008.25 *The process of Convergence Towards the Euro for the VISEGRAD – 4 Countries*, Giuliana Passamani

2009.1 *Income Shocks, Coping Strategies, and Consumption Smoothing. An Application to Indonesian Data*, Gabriella Berloffa and Francesca Modena

2009.2 *Clusters of firms in space and time*, Giuseppe Arbia, Giuseppe Espa, Diego Giuliani e Andrea Mazzitelli

2009.3 *A note on maximum likelihood estimation of a Pareto mixture*, Marco Bee, Roberto Benedetti e Giuseppe Espa

2009.4 *Job performance and job satisfaction: an integrated survey*, Maurizio Pugno e Sara Depedri

2009.5 *The evolution of the Sino-American co-dependency: modeling a regime switch in a growth setting*, Luigi Bonatti e Andrea Fracasso

2009.6 *The Two Triangles: What did Wicksell and Keynes know about macroeconomics that modern economists do not (consider)*? Ronny Mazzocchi, Roberto Tamborini e Hans-Michael Trautwein

2009.7 *Mobility Systems and Economic Growth: a Theoretical Analysis of the Long-Term Effects of Alternative Transportation Policies*, Luigi Bonatti e Emanuele Campiglio

2009.8 *Money and finance: The heterodox views of R. Clower, A. Leijonhufvud and H. Minsky*, Elisabetta de Antoni

2009.9 *Development and economic growth: the effectiveness of traditional policies*, Gabriella Berloffa, Giuseppe Folloni e Ilaria Schnyder

2009.10 *Management of hail risk: insurance or anti-hail nets?*, Luciano Pilati, Vasco Boatto

2010.1 *Monetary policy through the "credit-cost channel". Italy and Germany pre- and post-EMU*, Giuliana Passamani, Roberto Tamborini

2010.2 *Has food price volatility risen*? Chrisopher L. Gilbert and C. Wyn Morgan

2010.3 *Simulating copula-based distributions and estimating tail probabilities by means of Adaptive Importance Sampling*, Marco Bee

2010.4 *The China-US co-dependency and the elusive costs of growth rebalancing*, Luigi Bonatti and Andrea Fracasso

2010.5 *The Structure and Growth of International Trade*, Massimo Riccaboni and Stefano Schiavo

2010.6 *The Future of the Sino-American co-Dependency*, Luigi Bonatti and Andrea Fracasso

2010.7 *Anomalies in Economics and Finance*, Christopher L. Gilbert

2010.8 *Trust is bound to emerge (In the repeated Trust Game)*, Luciano Andreozzi

2010.9 *Dynamic VaR models and the Peaks over Threshold method for market risk measurement: an empirical investigation during a financial crisis*, Marco Bee e Fabrizio Miorelli

2010.10 *Creativity in work settings and inclusive governance: Survey based findings from Italy*, Silvia Sacchetti, Roger Sugden e Ermanno Tortia

2010.11 *Food Prices in Six Developing Countries and the Grains Price Spike*, Christopher L. Gilbert

2010.12 *Weighting Ripley's K-function to account for the firm dimension in the analysis of spatial concentration*, Giuseppe Espa, Diego Giuliani, Giuseppe Arbia

The Discussion Paper series provides a means for circulating preliminary research results by staff of or visitors to the Department. Its purpose is to stimulate discussion prior to the publication of papers.

Requests for copies of Discussion Papers and address changes should be sent to:
Dott. Luciano Andreozzi
e-mail: luciano.andreozzi@unitn.it
Department of Economics
University of Trento
via Inama, 5 - 38122 Trento (IT)