

# Newcastle University e-prints

---

**Date deposited:** 20<sup>th</sup> April 2012

**Version of file:** Author final

**Peer Review Status:** Peer reviewed

## Citation for item:

Gorton M, Zaric V, Lowe P, Quarrie S. [Public and private agri-environmental regulation in post-socialist economies: evidence from the Serbian Fresh Fruit and Vegetable Sector](#). *Journal of Rural Studies* 2011, **27**(2), 144-152.

## Further information on publisher website:

<http://www.elsevier.com>

## Publisher's copyright statement:

© Elsevier BV, 2011

'[Authors retain] the right to post a revised personal version of the text of the final journal article (to reflect changes made in the peer review process) on your personal or institutional website or server for scholarly purposes.'

The definitive version of this article is available at:

<http://dx.doi.org/10.1016/j.jrurstud.2010.12.002>

Always use the definitive version when citing.

## Use Policy:

The full-text may be used and/or reproduced and given to third parties in any format or medium, without prior permission or charge, for personal research or study, educational, or not for profit purposes provided that:

- A full bibliographic reference is made to the original source
- A link is made to the metadata record in Newcastle E-prints
- The full text is not changed in any way.

The full-text must not be sold in any format or medium without the formal permission of the copyright holders.

**Robinson Library, University of Newcastle upon Tyne, Newcastle upon Tyne.  
NE1 7RU. Tel. 0191 222 6000**

## Pre-publication copy of

Gorton, M., Zarić, V, Lowe, P. and Quarrie, S. (2011), Public and private agri-environmental regulation in post-socialist economies: Evidence from the Serbian Fresh Fruit and Vegetable Sector, *Journal of Rural Studies*, Vol.27, No.2, pp.144-152:  
<http://dx.doi:10.1016/j.jrurstud.2010.12.002>

### **Public and private agri-environmental regulation in post-socialist economies: evidence from the Serbian Fresh Fruit and Vegetable Sector**

#### **ABSTRACT**

Using primary survey data and interview evidence this paper analyses the implementation and enforcement of public and private environmental regulation in the Serbian Fresh Fruit and Vegetable (FFV) sector. This provides a basis for engaging in a wider debate on the nature of agri-food regulation in post-socialist economies. Depictions of the restructuring of agri-food supply chains as a shift from public to private regulation are rejected. Rather two distinct supply chains co-exist: a small number of export oriented producers operate subject to extensive private regulation while the majority of FFV farmers occupy regulatory voids, immune to both private and public control. Those farmers operating under extensive private regulation are more likely to obey appropriate public regulation. Findings highlight the differentiated nature of regulatory regimes that can co-exist within a national production sector.

#### **Key Words**

Agri-food regulation, agricultural standards, Serbia

#### **1. Introduction**

Globally, agri-food supply chains are being fundamentally transformed through greater internationalisation of markets (via a growth in trade, foreign direct investment and openness of

domestic markets) and regulation (spread of supra-national food laws, control agencies, certification bodies and private standards). The internationalisation of regulation is seen as both a response to, and catalyst for, greater international integration of markets. The restructuring of institutional regimes for agri-food production and marketing is altering profoundly the nature of market opportunities faced by, and the obligations placed on, producers globally (Hatanaka *et al.* 2006; Swinnen and Maertens, 2007; Vogel, 1995). For instance, while the reform of formal regulation may promote opportunities for some, there is a danger that it will act as a barrier to trade in cases where governments and producers lack the institutional capacity and financial resources to meet the obligations of access (Henson and Loader, 2001; Busch *et al.* 2005).

After the downfall of the Milošević regime, Serbia is, rather haphazardly, attempting to reform its economy and reintegrate into international markets and regulatory structures, and it has started out on the path toward European Union (EU) accession. Like many other post-socialist states, Serbia's economic fortunes during this process will be strongly tied to those of the agricultural sector. The agri-food sector accounted for approximately 14 per cent of Serbian GDP and 17 per cent of total exports in 2008 (Statistical Office of the Republic of Serbia, 2009). In rural areas, agriculture remains the largest employer and backbone of the economy (World Bank, 2006). Within agriculture, Fresh Fruit and Vegetables (FFV) are of strategic importance, contributing 30 per cent of total agri-food exports by value in 2009 (Statistical Office of the Republic of Serbia, 2010). Moreover, FFV is widely perceived to be one of the few areas where Serbia could significantly increase its agri-food exports and the country has a longstanding international reputation for certain products such as raspberries.

This paper analyses the implementation and enforcement of public and private agri-environmental regulation in the Serbian FFV sector. In doing so the paper seeks to contribute to the literature on two grounds. First, as noted by Ouma (2010, p.199) 'little is known in economic geography and related disciplines about how quality standards... are actually implemented [and]

enforced’, with a need to analyse how farmers ‘connect with these standards’. This is despite widespread acknowledgement of their growing importance for some producers and as a factor mediating rural development (Busch, 2000; Hatanaka *et al.* 2005; Jaffee and Henson, 2005; Swinnen and Maertens, 2007). This calls for fieldwork that engages with producers and is aware of the potential gap between formal regulations and everyday practices. Our focus is thus on implementation and enforcement rather than the process of standards setting. Second, utilising data from Serbia we seek to contribute to a wider literature on the reform of agri-food governance outside of ‘mature’, capitalist economies. The findings detail the presence of varied regulatory regimes co-existing within the same state: while the majority of producers operate in a regulatory void others are subject to extensive external control via private standards.

## **2. Public and Private Agri-environmental Standards and the Regulation of Production**

Agricultural standards can be defined as rules governing the outcome or processes of the primary production of food and fibre. Agricultural standards may pertain to: (a) quality (e.g. organoleptic or cosmetic), (b) safety (e.g. freedom from contaminants or use of approved pesticides), (c) authenticity (e.g. guarantee of particular origin or production method) and (d) production process (e.g. organic) (Reardon, 2006). Such standards may be initiated and enforced by public sector agencies (hereafter referred to as public standards) or non-state actors (private standards). The operationalisation of standards involves several distinct processes: setting, adoption, implementation and enforcement (Henson and Humphrey, 2009).

In most European countries, the setting of public agricultural standards is strongly internationalised. For example in the UK, the Chemicals Regulation Directorate (CRD) undertakes surveillance and enforcement sampling of pesticide residues in accordance with Regulation (EC) No 396/2005 of the European Parliament and of the Council on maximum residue levels (MRLs). MRLs in the UK are thus set at the supra-national level although

enforcement rests with national bodies and local authorities. The UK and all other member states of the EU, as well as the European Commission, are members of the Codex Alimentarius Commission (CAC), which oversees revisions to the *Codex Alimentarius*. The latter is a set of international, public standards for food production and hygiene, developed by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization. The CAC has a dedicated committee on pesticide residues which establishes and reviews MRLs for particular pesticides. In contrast to the UK, Serbia's regulations on MRLs are inconsistent with European regulations and date back to the Yugoslav era (Federal Republic of Yugoslavia, 1992). At the time of writing (Autumn 2010) Serbia was not yet an official candidate for EU membership and had not begun the formal process of legal harmonisation (approximation). While Serbia is a member of the CAC, it has been peripheral in terms of standards setting and Serbian and international MRLs remain inconsistent (Škrbić and Predojević, 2008).

Private standards may be third party arrangements, such as GlobalGAP (formerly EurepGAP) or the British Retail Consortium (BRC), or buyer specific (controlled independently by, for example, a single retailer). GlobalGAP is the most prominent private standard, requiring producers to demonstrate Good Agricultural Practices (GAPs) relating to sanitary, phytosanitary and environmental concerns (Henson and Humphrey, 2009; Ouma, 2010). A consortium of European retailers established GlobalGAP and its spread has been dramatic: by 2008, 94,000 producers, in more than 80 countries, were certified and operating according to the standard. While GlobalGAP's membership base increased dramatically, 'executive power still rests with an exclusive club made up of representatives of big retailers and suppliers mainly from the global North' (Ouma, 2010, p.201).

For FFV, private agri-environmental standards typically cover pesticide use and application rates, traceability, water management, adoption of Integrated Crop Management systems, record keeping and self-inspection, harvesting and packaging, and transportation

practices. These private standards, developed initially in response to food safety concerns surrounding the potential contamination of FFV with food poisoning bacteria (such as E coli 0157 or salmonella) and attempts to reduce pesticide residues, have evolved to embrace wider ethical and environmental concerns. In part, private standards are designed to ensure that producers meet the requirements of public standards. GlobalGAP, for example, seeks to make certain that FFV production complies with EU regulations on MRLs. However, private standards often 'go beyond' the requirements of public standards (Henson and Humphrey, 2009). For instance in 2007, the German retailer Metro unilaterally announced that it would only stock FFV with less than 70% of EU MRLs and would delist suppliers that failed to meet the tighter standard (Planet Retail, 2007).

For FFV sold through the leading international retailers, private standards are the norm (Henson and Humphrey, 2009). Given the increasing concentration of global grocery markets, these retailers act as significant 'gatekeepers' to consumers. The use of private standards by non-leading retailers in both developed and developing countries is also growing (Berdegué *et al.* 2005; Fulponi, 2007). In local and wholesale markets in developing and transitional economies, private standards are rarely applied. However these fringe markets are declining in importance as supermarkets expand rapidly (Reardon *et al.* 2007a).

Campbell *et al.* (2006) interpret the growth of private standards as symptomatic of the neo-liberalisation of agri-food production. The neoliberal model of food regulation rests on the belief that human welfare can best be advanced by liberating entrepreneurial activities within an environment characterised by robust property rights, free markets and trade (Guthman, 2008). Advocates of a neo-liberalist approach argue that firms face strong commercial incentives to maintain customer loyalty and avoid damaging their reputation, so that self or market regulation, although based on private rather than public interest, may achieve outcomes that are similar or superior to state regulation. The latter is deemed often superfluous and dated, so that 'regulated

markets have not proven efficient in responding to market forces and capitalising on new market opportunities' (OECD, 1997, p.245).

Busch and Bain (2004) perceive the growing practical influence of neo-liberalism has led to a 'shift from public to private regulation' (p.324). In contrast, the functions of the nation state are being 'hollowed out: 'redistributed upwards, to international and transnational organisations and institutions, downwards, to cities and regions, and outwards to non-state actors' (Jessop, 2002, p.159). As an illustrative case study of hollowing out, Busch (2000) notes that in Michigan, previously mandatory state standards became only advisory. Instead, exporters contract directly with British multiple retailers based on the latter's quality standards. Under this state/market binary framework, private agricultural standards offer a competing governance mechanism to public regulation (Manning and Baines, 2004).

The interpretation of the growth of private standards as characteristic of a stark shift away from public regulation has been, however, questioned extensively (Goodman and Watts, 1994; Guthman, 2007; Guthman, 2008). Guthman (2007), drawing on the work of Peck and Tickell (2002), distinguishes usefully between 'roll-back' and 'roll-out' neo-liberalization. The former refers the hollowing out of welfare / regulatory states. Roll-out neo-liberalization captures the development of new public-private institutional forms that were required to deal with inequalities and regulatory gaps created by the initial 'roll-back' process. The rollout phase of neo-liberalism is thus characterised by significant *re*-regulation and building of networks of governance. The creation of an enabling environment for 'market forces' requires new rules, rule-making bodies and coalitions of actors (Peck, 2004). For instance, Codex standards incorporate the approach pioneered by the U.S. government's Hazard Analysis and Critical Control Point system. This requires managers, amongst other things, to establish: critical control points, record keeping procedures and systems for validation. Dunn (2008, p.252) argues that Codex by incorporating the principles of devolved, self regulation is 'a good example of

neoliberal government at a distance'. Yet to form and revise Codex standards requires a complex set of committees, drawing on national Ministries, international agencies, scientific experts and industry representatives (Lee, 2009).

Several authors attempt to characterise new modes of governance in the agri-food sector, defined by a cross-fertilisation of private and public regulation with the state co-opting aspects of, and instruments initially designed for, private governance with much private regulation becoming legally sanctioned and coercive in nature. This realignment has been referred to as hybridisation (Barling, 2004) or a form of co-regulation (Fearne and Garcia Martinez, 2005). The latter is defined by Garcia Martinez *et al.* (2007, p.302) as 'an approach in which a mixture of instruments is brought to bear on a specific problem...[which] involves self-regulation and legislative action working together in a manner that mutually reinforces one another'. An element of co-regulation is, according to Garcia Martinez *et al.* (2007), therefore co-operation between public and private sectors in the process of creating new rules.

The majority of empirical studies focus on mature, capitalist countries, skewing the development of theory regarding new modes of governance in the agri-food sector (Guthman, 2007). For instance, the application of the notion of 'roll-back' neo-liberalism is specifically designed to capture reforms that occurred in states previously anchored in what Jessop (1997) terms 'Atlantic Fordism'. However, several studies do specifically address developing states, particularly the question of whether farmers in developing states are able to meet the private standards of, for the most part Western, food retailers (Dolan and Humphrey, 2000; Okello and Swinton, 2007; Reardon *et al.* 2009). These studies found that the imposition of tighter standards, most commonly GlobalGAP, tend to lead to a shake out of the supply base, with a significant reduction in sourcing from small farms (Dolan and Humphrey, 2000; Hernández *et al.* 2007; Humphrey, 2009). However small-scale producers may continue to serve 'modern' supply chains if larger operators are absent (Reardon *et al.* 2007b) or they institute successfully co-

operative marketing arrangements (Narrood *et al.* 2009). Yet it should be noted that most of these studies focus on developing states that are longstanding agri-food exporters to Western markets such as Kenya (Dolan and Humphrey, 2000; Okello and Swinton, 2007; Narrod *et al.* 2009), Guatemala (Berdegue *et al.*, 2005; Hernández *et al.* 2007) and Mexico (Reardon *et al.*, 2007b). Access to reformed supply chains may be more problematic for producers in countries lacking traditional export infrastructure, marketing arrangements and training systems.

In one of the few studies of the impact of food standards in a post-socialist context, Dunn (2003, p.1495) argues that they have unannounced and unforeseen consequences when they encounter ‘specific geographies with their own histories, institutional structures, and social norms’. Based on ethnographic research for the Polish meat industry, Dunn (2003) notes that international standards and multinational agribusiness encountered strong resistance from Polish smallholders and meatpackers, who used a variety of mechanisms, honed in the socialist era (unofficial markets, networks of political protest) to create other, informal, nontariff trade barriers. As standards are implemented in particular local contexts they, therefore, generate ‘unique regulatory landscapes rather than the uniform ones standardizers envisage’ (Dunn, 2003, p.1495).

In subsequent work on the Republic of Georgia, Dunn (2008) notes that despite the Saakashvili government’s attempts to integrate with Western standards and international agencies, the collapse of the domestic food industry left the country dependent on household, subsistence production. The latter inhabits a ‘stateless space’ outside of neoliberal projects because it is ‘not interesting enough, or not useful enough, to merit governance’ (p.255). Notwithstanding some notable exceptions, such as viticulture, Georgian agriculture is an ‘abandoned territory: a space free from mobile neoliberal calculations because neither state agencies nor capitalist firms choose to calculate there’ (Dunn, 2008, p.255). This calls for greater

attention to be paid to how standards ‘become *geographically variable* as they are implemented in particular contexts’ (Dunn, 2003, p.1495).

The growth of international public and private agricultural standards is important for the Serbian FFV sector because it affects Serbia’s ability to access new markets (especially the value-added ones of Western Europe) and come to terms with less favourable access to existing/nearby markets as neighbouring countries join the EU. Accessing these European export markets requires both compliance with international public standards and, increasingly, stiffer private regulation from the main buyers.

### **3. Methodology**

To assess the implementation and enforcement of public and private regulation, the authors conducted both a survey of commercial Serbian FFV producers and in-depth interviews with key actors. The survey collected data on compliance with, and knowledge of, public environmental regulations, attitudes to state regulation, current problems faced by farmers, buyer requirements and use of private standards, and farm / farmer characteristics. Farmers were also given the opportunity to provide additional, qualitative responses, presenting their views and situation. Collectively the survey sought to obtain a picture of commercial FFV producers’ engagement with public and private environmental regulation. The sample comprises 165 useable responses.

Data collection from commercial FFV farmers occurred in two locations: (a) municipality of Grocka and (b) from the rest of Serbia. Grocka was chosen as the principal fruit growing area in the country, renowned for its sour cherries, apricots, plums, peaches and grapes. Production is organised mainly on small, privately-owned family farms.<sup>1</sup> All the surveyed farms are

---

<sup>1</sup> At the outset of the research it was expected that the penetration of private, and enforcement of public, regulation may be higher in Grocka given the importance and concentration of FFV production in this area. However, as there are no significant differences between the samples from Grocka and the rest of Serbia in terms of the implementation and enforcement of regulation, this distinction is not pursued in the analysis.

commercial producers.<sup>2</sup> Survey data indicate that their main income comes from selling FFV, principally via local wholesale markets.

Table 1 details the structure of the sample compared against data on farm structures taken from the 2002 Agricultural Census. As the sample excludes subsistence holdings, farms of less than 3 ha are underrepresented and farms of greater than 10 hectares are overrepresented compared with the Agricultural Census. Consequently the mean farm size in the sample is higher (5.5 ha) than that reported in the 2002 Census (3 ha).

Table 1 about here

Before conducting the survey, the authors met with key persons (village mayors, district councillors, prominent farmers) in Grocka and contacted other FFV farmers and support organisations in Serbia. This allowed for initial discussion of the project's objectives and assisted with the construction of the sample frame. Individual farmers were identified from contacts with local and regional authorities, village mayors, other farmers and personal contacts, from which a cross-section of respondents was drawn. Survey data collection occurred in 2005/6 via face to face interviews, conducted usually on-farm. Five farmers, approached face-to-face, refused to answer the survey questions.

In addition, in-depth interviews were conducted with 19 key policy actors (current and ex-officials of the Ministry of Agriculture, Forestry and Water Management [MAFWM], Ministry of Science and Environmental Protection, the Water Inspectorate and other Serbian institutes, European agencies and commercial producers). The semi-structured interviews occurred between 2004 and 2009, with some aiding questionnaire design and others addressing the survey's findings and implications.

---

<sup>2</sup> A commercial farm is defined as one which sells a proportion of its production (market exchange) and is contrasted with subsistence producers, where agri-food output is consumed within the household. The World Bank (2006) estimates that only 100,000 of Serbia's 600,000 'family farms' are commercially oriented.

## 4. Results

### *4.1 Public Regulation*

Survey and interview evidence indicate that enforcement of public environment standards is, overall, very poor. This section highlights three examples: permits for water extraction, pesticide use and quality control, and non-cultivation of land. The section concludes with a discussion of farmers' overall assessment of the Serbian state's regulatory capacity.

#### *Permits for water extraction*

According to the 1991 Water Law, farmers should possess a permit or licence for water extraction from rivers, streams, bore holes and, in certain circumstances, from natural springs and wells. Survey data (Table 2) indicate that this is occurring only in a minority of cases.<sup>3</sup> River or stream extraction was used as a source of water by 30 farmers, of whom only 6 had a permit or licence. Similarly, bore holes were used by 25 farmers but only 6 were licensed. Sixteen farmers in the sample utilised natural springs or wells, but only one had the requisite permit to use it. These breaches of the Water Law are unlikely to be investigated because individually they are not viewed as a priority by the chronically under-funded Water Inspectorate. As one farmer noted 'No one pays for water or has permits. Who will know?' Yet the collective impact of unregulated extraction on water resources is significant (UNECE, 2002).<sup>4</sup>

Table 2 about here

On average the 13 farmers with appropriate permits/ licences, sold 46 per cent of their output on contract (with a private buyer) compared with only 20 per cent for those with

---

<sup>3</sup> The data in Table 2 refer to farmers who require a permit / license for extraction. Other farmers may use mains water or irrigation water which does not require such a permit / license for extraction.

<sup>4</sup> Excessive extraction reduces water quality as rivers and aquifers lose their dilution capacity for absorbing diffused pollution. Illegal extraction also reduces the supply of resources available for legal use (e.g. public water systems).

unauthorised water use. This suggests a potential linkage between private sector contracting and adherence to state legislation, which is explored in greater depth below. The differences between those adhering to and those ignoring state regulation however cannot be reduced purely to a debate about scale: there are no significant differences between those without and those with permits / licences in terms of farm size (the means for the two groups are 6.2 and 6.8 ha respectively).

### *Pesticide use and quality control*

In Serbia, there is a lack of transparency on pesticide use and their application is largely left to the conscience of individual producers with few checks and controls. No comprehensive testing for contamination of agricultural soils or FFV sold on the domestic market occurs (Marković *et al.* 2010). It is common for FFV farmers to overuse pesticides, both in terms of the number and concentration of treatments. On the one hand small-scale farmers do not have precise equipment for measurement and on the other hand they want to make sure that the ‘pesticide does its job’. Moreover, some producers fail to observe guidelines on the time that should elapse between treating crops and market sales (usually 40 days). One former Minister of the MAFWM noted that ‘farmers often have two different production methods; one for the market and other for production for self-consumption. Basically the difference in the methods relates to the amount and frequency pesticides are used’.

The 2009 Law on Pesticides charges the plant inspection department of the MAFWM with the task of controlling the use of pesticides, principally through residue testing, and reviewing records which producers are legally obligated to keep. However, survey evidence suggests that out of 165 farmers, only 19 kept a pesticide log. Those that maintained a pesticide log did so principally at the insistence of private buyers. According to one ex-official of the MAFWM, in 2007 there were only 34 phytosanitary inspectors of which 29 were assigned to border posts. Given that Serbia has approximately 600,000 ‘family farms’ (World Bank, 2006),

which are overwhelmingly not engaged in exporting, the probability of a state inspection of a pesticide log is remote.

In practice, therefore, state phytosanitary inspectors only control the quality of FFV at Serbia's borders (both exports and imports). These inspectors check declarations and grading, and test samples for residues, contaminants and water content. Border inspections have uncovered extensive evidence of inappropriate pesticide use. For example, in 2007 a consignment of peaches bound for Slovenia contained ten times the EU permitted threshold for *dimethoate* (an insecticide). The explanation of the Minister of Agriculture was that it was due weather conditions: "We had a dry year and maybe a little more application of chemicals" (Knezović, 2007).

The absence of quality control by the state is despite the fact that some land used for growing crops is severely contaminated, typically from industrial pollution (Marković *et al.* 2010). For example the Kolubarskog Basin suffers from arsenic poisoning derived from lignite dust. Some exporters, who know that their produce will not meet the pesticide residue and contaminant (e.g. lead, mercury, arsenic) thresholds of importing countries, switch their produce to the unsupervised local market. As one farmer noted: 'there are no limits or regulations on the use of pesticides or fertilisers and no one takes samples or checks the level of contamination on the market....farmers apply large doses of chemicals'.

Storage and disposal of pesticide packaging is also a problem. Serbia currently does not have any designated location for disposal of dangerous waste or packaging for pesticides. Farmers do not feel obliged to collect and safely dispose of the packaging. New procedures on waste packaging and wrapping material, which would include a deposit and obligation to return the packaging to wholesalers, are yet to become law.

### *Cultivation of arable land*

According to the law on agricultural land, all arable land must be cultivated. Otherwise, the owner of the land is obliged to pay a fine. Although this policy has been in existence since the 1990s, official statistics record around 100,000 ha of arable land being left uncultivated annually.<sup>5</sup> Despite such a significant land area remaining uncultivated, there is no evidence of any landowners ever paying a fine. Similarly, every year some agricultural land is transferred to other uses, mainly private construction, which according to Serbian law, requires a permit and payment for change of land use. An ex-employee of the MAFWM estimated that approximately only half of changes are reported to the authorities. This may be an underestimate: Petrović (2001) calculates that over 80 per cent of new flats and houses built in Belgrade during the 1990s were done so illegally, amounting to some 200,000 homes.

### *Overall assessment of Serbian state's regulatory capacity*

The survey elicited farmers' beliefs regarding the Serbian state's ability to effectively regulate agri-environmental issues. Respondents rated the degree to which they agreed with statements on a five-point Likert scale, ranging from 1 'strongly disagree' to 5 'strongly agree'. Farmers have strikingly little faith in public regulation: for example, less than five per cent agreed or strongly agreed with the statement that 'farm polluters are fined when they break the law' (Table 3). Only 5.4 per cent of respondents agreed or strongly agreed with the statement that 'water use is effectively controlled by the state'. The inability of the state to implement and enforce public standards mirrors the findings of Berdegué *et al.* (2005) for Central America. The majority of Serbian FFV farmers thus operate in 'stateless spaces' akin to what Dunn (2008) describes for the Republic of Georgia. However, while in the Georgian case, household food

---

<sup>5</sup> One surveyed farmer revealed that his farmland was left uncultivated in 2004.

production lay outside any regulatory regime, in Serbia it is the bulk of commercial farms as well.

Table 3 about here

Overall there are 8 farmers in the sample who on average ‘agree’ or ‘strongly agree’ with the statements in Table 3. These eight farmers are not significantly larger in size than the rest of the sample but do sell a higher proportion of their output on contract (40 per cent) compared to the rest of the sample (13 per cent).

#### *4.2 Private Regulation*

Regarding the implementation of private standards, farmers were asked about the behaviour of buyers and any regulations enforced concerning quality control, the use of pesticides and water testing (Table 4). Results are disaggregated to compare those selling to domestic and foreign buyers with the former group split between those with and without a contract (all those supplying a foreign owned buyer had a contract). In less than 5 per cent of cases is the main buyer foreign owned. Firstly considering the whole sample, the most salient private regulation is at the point of supply: 16.4 per cent of buyers reject produce in poor condition; but only one in ten buyers test for contaminants. Fewer than 11 per cent of farmers are required to keep a pesticide log. Only 5.5 per cent are directed as to what agri-chemicals to use and only 4.8 per cent have their water quality tested.

Significant differences are apparent depending on the type of main buyer (Table 4).<sup>6</sup> Private regulation is almost entirely absent for farmers supplying domestic buyers without a contract. These farmers sell via spot (wholesale) markets without guaranteed prices, and buyers

---

<sup>6</sup> The analysis focuses on relationships by type of main buyer. Data collection, however, captured all supplier relationships. This revealed that the vast majority deal exclusively with only one type of buyer. For instance, 74.3 per cent of farms sampled supplied only local markets and auctions. From the eight firms that sold to foreign owned buyers on contract only two also supplied local markets and auctions.

do not interfere with agricultural practices. This type of buyer also does not provide any credit, physical inputs, training, transportation, loan guarantees, machinery, specialist on-farm storage, or investment to farmers. This is similar to the *modus operandi* of local and wholesale markets in developing countries (Humphrey, 2009).

In contrast all foreign buyers reject produce that is in poor condition. In seven out of the eight cases of farmers having a foreign purchaser, the buyer tests for contaminants, insists that a pesticide log is kept, specifies what agri-chemicals can be used, tests water quality and rejects output with contaminants/residues above agreed threshold levels. For those who supply foreign owned buyers, private regulation is therefore of greater practical relevance. This mirrors the findings for export led supply chains in developing countries (Dolan and Humphrey, 2000; Ouma, 2010). However, the greater practical relevance of private regulation for Serbian FFV exporters has not emerged out of a conscious political strategy of deregulation, hollowing out of the state or public-private co-operation, as has been depicted for many Western markets. Rather it reflects the state's failure to adequately implement and enforce its own regulation and the role of private standards in determining international market access.

Those who supply domestically owned buyers with a contract lie between these two extremes: the majority of domestically owned buyers who use contracts do reject produce that is in poor condition but only a minority stipulate specific agri-environmental practices. A gradient of rising private regulation is therefore apparent from domestic wholesale markets to domestically managed contracts and then contracts with foreign owned buyers. In terms of the involvement of buyers in production practices the greatest jump is between domestically oriented contracts and those with foreign owned buyers.

Table 4 about here

Farmers rated potential problems on a five point scale, ranging from 1 equals of 'no importance to them' and 5 'most important problem they face'. Again the sample is divided into three groups (those selling to a domestically owned main buyer without a contract, domestic buyer with contract, and foreign-owned buyer with contract). The mean scores for each group and ANOVA *F*-test statistics are reported in Table 5.

Table 5 about here

For all three groups of farmers, the most pressing problems are low prices, meeting the quality standards of buyers and price fluctuations. However significant variations in the ratings of potential problems are apparent between the three groups. Those supplying domestic buyers without a contract record a higher mean score for low prices received, meeting the quality standards of buyers and price fluctuations. As Reardon *et al.* (2007b) note for Mexico, these farmers are most likely to be trapped in a vicious circle of low value-added production. However, at present there are minimal immediate incentives for such producers to improve their environmental practices as most domestic purchasers do not insist on this, and they do not pay a premium for FFV produced under such conditions. As this group sells via wholesale markets price fluctuations are relatively more pronounced. Access to inputs is a more serious problem for these farmers but, as transactions are immediate, then delayed payments from buyers are fairly insignificant.

Farmers who supply foreign owned buyers suffer more from delayed payments than problems of access to inputs. Those possessing contracts with domestically owned buyers report meeting the quality standards of buyers being slightly less of a problem (and low prices received as a higher problem) than farmers with contracts with foreign owned companies. This may reflect that private regulation is less developed on the domestic market so that it is easier to meet the demands of such buyers. Farms supplying foreign owned buyers are noticeably larger (mean

of 16.45 ha) than those supplying domestic buyers either with or without a contract (means of 6.07 and 5.76 ha respectively). This echoes work on developing countries which found that small-scale producers are more likely to serve the domestic rather than export markets (Dolan and Humphrey, 2000; Humphrey, 2009).

#### *4.3 Linkages between public and private regulation*

Significant differences are apparent between farmers' attitudes to the Serbian regulatory system and the type of main buyer (Table 6), although the ordering of trust varies across the scale items. Those without a contract supplying domestic buyers overall have the lowest level of faith in the Serbian regulatory system. This group is pretty immune to any private or public regulation. Overall, those supplying a domestic buyer on a contractual basis have the most confidence in Serbian public regulation although this is still modest. It may be that those supplying foreign owned buyers are more aware of international public and private standards and are therefore more critical than those who contract with domestic firms.

Table 6 about here

Figure 1 details consistent relationships between the imposition of private environmental standards and possession of an appropriate state permit/licence for water extraction. For instance, of those whose buyer specifies what agri-chemicals can be used, 50 per cent have an appropriate state licence. In contrast, of those whose buyer does not specify what agri-chemicals can be used, only 15.8 per cent have an appropriate state licence or permit. Similarly, for those whose buyer tests the quality of water used, 50 per cent have an appropriate licence/permit for water extraction against only 15.8 per cent of those whose farm water is not tested. While there is thus widespread flouting of state regulation, and notwithstanding the relative small number of responses in this category, those who are subject to private environmental standards appear more likely to obtain appropriate public permissions.

Those serving foreign owned buyers who meet state regulations are therefore subject to co-regulation in the sense that ‘a mixture of public and private regulatory instruments is brought to bear on a specific problem’ (Garcia Martinez *et al.*, 2007, p.302). However, this has not emerged out of co-operation between the public and private sectors. No interviewee identified any instance of explicit co-operation between private sector actors and the Serbian state regarding FFV standards and regulation.

Figure 1 about here

The main reason cited for greater adherence to public regulation by those supplying foreign entities was to ‘legitimise’ their activities and avoid being excluded by buyers as part of their monitoring process. For example one market gardener, who supplied salads to an international hospitality company remarked: ‘my salad washing plant is illegally built and I do not pay for my washing water. I paid a Milošević official to sort it out and have never received a bill. I want to obtain retrospective legalisation of my premises and will have to construct a holding reservoir for waste processing water. To do this I need to build an accumulator to prevent waste water going into the local channel. This is a condition of Belgrade City Council. This is an extra cost and time consuming...[but]..I do not want to jeopardise my exclusive producer status [with buyer].’

Two distinct supply chains, therefore, co-exist in Serbia. There are a small number of larger producers that supply export markets and comply with the extensive private standards of international buyers. As for FFV exporters in developing countries, the implementation and enforcement of these standards results ‘in a previously unknown degree of formal supply-base monitoring and quality assurance’ (Ouma, 2010, p.211). Meeting these standards is a condition of entry to such export supply chains. Distinct from such producers is a mass of small-scale

farms that serve local and wholesale markets. In practice these producers are subject to little public or private regulation. In keeping with local and wholesale markets in many emerging economies (Humphrey, 2009; Henson and Humphrey, 2009), there is no pressure from buyers to adopt private standards and public regulation is poorly enforced. What is currently absent from Serbia is a third potential supply chain – large grocery retailers serving the domestic market. Food retailing remains extremely fragmented in Serbia with those supermarkets chains that are present being small and procuring FFV via specialist wholesalers. This contrasts with many other states in Central and Eastern Europe, East Asia and Central America which witnessed the rapid growth of supermarket chains in the late 1990s and early 2000s, often linked to foreign direct investment (Dries *et al.* 2004; Reardon, 2006; Reardon *et al.* 2007). Large supermarket chains in emerging markets typically adopt private standards to protect the global reputation of the retailer and maximise the value gap with traditional formats (Berdegué *et al.* 2005). Wholesale markets are by-passed in favour of centralised procurement systems (Dries *et al.* 2004; Berdegué *et al.* 2005). This may lead to the displacement of local, small-scale producers. For instance, the Republic of Moldova has a longstanding reputation in horticulture, yet two years after Metro Cash & Carry entered the Moldovan market, announcing that it was willing to procure from domestic producers, all local suppliers were still unable to meet its quality and quantity requirements so that the company imported all of its FFV (Gorton and White, 2007). There is a danger that producers unable to meet the private standards of multiple retailers, in countries dominated by supermarkets, will be sidelined into declining, low value-added markets, further depressing rural incomes and stimulating out-migration.

## **5. Conclusions**

This paper assesses the enforcement of public and private environmental regulation in the Serbian FFV sector as a basis for engaging in wider debates concerning agri-food governance. Rather than a broad shift from public to private regulation (Busch and Bain, 2004), survey

evidence reveals that the Serbian case is characterised by the co-existence of two supply chains with markedly different regulatory systems. The majority of producers supply the local market and are subject to minimal public or private regulation. These farmers inhabit stateless spaces and at present there is little internal pressure from either public bodies or local private buyers for these producers to alter their practices. While such producers are often seen as characteristic of the 'global South' (Ouma, 2010), our evidence highlights their importance with a European state as well. Co-existing alongside these stateless spaces is a smaller group of producers, subject to tight regulation, who are integrated into international agri-food systems. As Dunn (2008) notes for Georgia, and clearly evident in Serbia, international standards rather than promoting uniformity and inclusion, in post-socialist economies are creating more variegated spaces of differential regulation. Initiatives such as GlobalGAP and company specific private standards therefore represent a novel and increasingly important form of socioeconomic polarization both within and across post-socialist states.

Private regulation is often depicted as an alternative or competing governance mechanism to the state (Manning and Baines, 2004). However, regarding the relationship between enforcement of public and private regulation in Serbia, there is some evidence of a linkage between engagement in contracting and compliance with private and public environmental standards / regulation. As part of fulfilling the private requirements of buyers, producers may seek to legitimise their practices according to domestic law. In this way private standards rather than being a replacement for public regulation or a form of environmental deregulation may actually promote or reinforce a degree of compliance. However, given the relatively small number of Serbian farmers that supply under contract, this conclusion remains tentative. However, it is clear in the Serbian case that any relationship between private standards and compliance with the state has not emerged out of formal co-operation between the two or the 'bolting on' of private controls to domestic legislation. Rather, it is largely an unintended consequence.

Much previous work, based on mature capitalist economies, links the reform agri-food supply chains to wider processes of neo-liberalization (Guthman 2007, 2008). However, historical models of ‘roll-back’ followed by ‘roll-out’ neo-liberalization, while fitting states previously anchored in Atlantic Fordism, sit uneasily with the Serbian case. The Serbian state does not effectively regulate agri-environmental activities. This is not due to a triumph of neo-liberalism, or the product of a reconstituted, hollowed out state underlying competitive capitalism, but rather reflects a longstanding inability of the state to produce environmental public goods.

At present the majority of FFV producers in Serbia serve the domestic market with little pressure to adopt private standards. Given there is no price premium on the domestic market for observing such standards, forcing producers, at least in the short-term, to comply would be counterproductive. However, if Serbia were to undergo the rapid growth of supermarket chains, private standards would become more salient, raising the prospect of domestic producers being displaced. Under this scenario, if small-scale FFV producers were unable to upgrade, a significant shake out of the supply base would be likely. Those remaining in farming but excluded from supplying supermarkets face being condemned, in the long-run, to supplying only increasingly low value added and declining wholesale markets.

## **References**

Barling, D., 2004. Food Agencies as an institutional response to policy failure by the UK and the European Union. In: Harvey, M., McMeekin, A., & Ward, A, (eds). *The Qualities of Food*, Manchester: Manchester University Press, pp.108-128.

Berdegúe, J.A., Balsevich, F., Flores, L., and Reardon, T., 2005. Central American supermarkets’ private standards of quality and safety in procurement of fresh fruits and vegetables, *Food Policy*, **30**(3), pp.254-269.

Busch, L., 2000. The moral economy of grades and standards, *Journal of Rural Studies*, Vol.16(3), pp.273-283

Busch, L. and Bain, C., 2004. New! Improved? The Transformation of the Global Agrifood System, *Rural Sociology*. Vol.69(3), pp.321-346.

Busch, L., Thiagarajan, D., Hatanaka, M., Bain, C., Flores, L.G. and Frahm, M., 2005. The relationship of third-party certification (TPC) to sanitary/phytosanitary measures and the international agri-food trade: final report for USAID.

Campbell, H., Lawrence, G. and Smith, K., 2006. 'Audit cultures and the antipodes: the implications of EurepGAP for New Zealand and Australian agri-food industries'. In Marsden, T. and Murdoch, J. (eds.), *Between the Local and the Global: Confronting Complexity in the Contemporary Agri-Food Sector*, Oxford: Elsevier, pp.69-93

Dolan, E. and Humphrey, J., 2000. Governance and Trade in Fresh Vegetables: The Impact of UK Supermarkets on the African Horticulture Industry, *Journal of Development Studies*, 37(2), 147-176.

Dries, L., Reardon, T. and Swinnen, J., 2004. The Rapid Rise of Supermarkets in Central and Eastern Europe: Implications for the Agrifood Sector and Rural Development, *Development Policy Review*, 22(5), pp.525-556.

Dunn E.C., 2003. Trojan pig: paradoxes of food safety regulation, *Environment and Planning A*, 35(8), pp.1493-1511.

Dunn, E.C., 2008. Postsocialist spores: Disease, bodies, and the state in the Republic of Georgia, *American Ethnologist*, 35(2), pp. 243-258

Fearne, A. and Garcia Martinez, M., 2005. Opportunities for the coregulation of food safety: insights from the United Kingdom, *Choices*, 20(2), pp. 109–116.

Federal Republic of Yugoslavia, 2002. Guidelines on the level of pesticides, metals, metalloids and other contaminants in foods [in Serbian]. Official Journal of the Federal Republic of Yugoslavia 5: 67–85 (in Serbian).

- Fulponi, L. 2007. The Globalization of Private Standards and the Agri-food System. In J.F.M. Swinnen, (ed.) *Global Supply Chains, Standards and the Poor*, Wallingford: CABI Publishing, pp.5-18.
- Garcia Martinez, M., Fearn, A., Caswell, J.A. and Henson, S., 2007. Co-regulation as a possible model for food safety governance: Opportunities for public-private partnerships, *Food Policy*, **32**(3), pp.299-314.
- Goodman, D. and Watts, M., 1994. Reconfiguring the rural or fording the divide? Capitalist restructuring and the global agro-food system, *Journal of Peasant Studies*, **22**(1), pp.1–45.
- Gorton, M. and White, J., 2007. The Restructuring of Agri-Food Supply Chains in CEE and the CIS: An Overview and Policy Implications, *Outlook on Agriculture*, **36**(4), pp.237-246.
- Guthman, J., 2007. The Polanyian Way? Voluntary Food Labels as Neoliberal Governance, *Antipode*, **39**(3), pp.456-478.
- Guthman, J., 2008. Neoliberalism and the making of food politics in California, *Geoforum*, **39**(3), pp.1171–1183.
- Hatanaka, M., Bain, C. and Busch, L., 2005. Third-party certification in the global agrifood system, *Food Policy* **30**(3), pp.354–369.
- Hatanaka, M., Bain, C. and Busch, L., 2006. Differentiated standardization, standardized differentiation: the complexity of the global agrifood system. In Marsden, T. and Murdoch, J. (eds.), *Between the Local and the Global: Confronting Complexity in the Contemporary Agri-Food Sector*, Oxford: Elsevier, pp.39-68.
- Henson, S.J., Loader, R.J., 2001. Barriers to agricultural exports from developing countries: the role of sanitary and phytosanitary requirements, *World Development*, **29**(1), pp.85-102.
- Henson, S. and Humphrey, J. 2009. The Impacts of Private Food Safety Standards on the Food Chain and on Public Standard-Setting Processes, Paper Prepared for FAO/WHO. [http://origin-www.fsis.usda.gov/PDF/Codex\\_al32\\_09Dbe.pdf](http://origin-www.fsis.usda.gov/PDF/Codex_al32_09Dbe.pdf) (last accessed 15h November 2010).

Hernández, R., Reardon, T. and Berdegué, J.A., 2007. Supermarkets, Wholesalers, and Tomato Growers in Guatemala, *Agricultural Economics*, **36**(3), pp.281-290.

Humphrey, J. 2009. Private standards in Kenyan horticulture: did the donors respond effectively to the challenge? Paper presented at the 'Towards Priority Actions for Market Development for African Farmers, Nairobi, Kenya, 13<sup>th</sup> – 15<sup>th</sup> May.

Jaffee, S. and Henson, S., 2005. Agro-Food Exports from Developing Countries: The challenges posed by standards. In: Aksoy, M.A. and Beghin, J. (ed). *Global Agricultural Trade and Developing Countries*, Washington D.C.: The World Bank, pp. 91-114.

Jessop, B., 1997. Capitalism and its future: remarks on regulation, government and governance, *Review of International Political Economy*, **4**(3), pp.561-581.

Jessop, B., 2002. *The Future of the Capitalist State*, London: Polity.

Knezović, G., 2007. Otrovne breskve iz Srbije?, <http://www.poslovni.hr/54520.aspx>, 20<sup>th</sup> September.

Lee, R.P., 2009. Agri-Food Governance and Expertise: The Production of International Food Standards, *Sociologia Ruralis*, **49**(4), pp. 415-431.

Manning L., and Baines R.N., 2004. Globalisation: a study of the poultry meat supply chain. *British Food Journal*, **106**(10/11), pp 819-836.

Marković, M., Cupać, S., Đurović, R, Milinović, J. and Kljajić, P. 2010. Assessment of heavy metal and pesticide levels in soil and plant products from agricultural area of Belgrade, Serbia, *Archives of Environmental Contamination and Toxicology*, **58**(2), 341-351.

Narrod, C., Roy, D., Okello, J., Avendaño, B., Rich, K., and Thorat, A., 2009. Public-private partnerships and collective action in high value fruit and vegetable supply chains, *Food Policy*, **34**(1), pp.8-15.

OECD, 1997. OECD Report on Regulatory reform: thematic studies, Paris: OECD.

Okello J. and Swinton S., 2007. Compliance with international food safety standards in Kenya's green bean industry: Comparison of a small and a large-scale farm producing for export, *Review of Agricultural Economics*, **29**(2), pp.269-285.

Ouma, S. 2010. Global standards, local realities: private agrifood governance and the restructuring of the Kenyan horticulture industry, *Economic Geography*, **86**(2), 197-222.

Peck, J., 2004. Geography and public policy: constructions of neoliberalism, *Progress in Human Geography*, **28**(3), pp.392-405.

Peck, J. and Tickell, A., 2002. Neoliberalizing space, *Antipode*, **34**(3), pp.380-404.

Petrović, M., 2001. Post-Socialist Housing Policy Transformation in Yugoslavia and Belgrade, *European Journal of Housing Policy* **1**(2), pp.211-232.

Planet Retail, 2007. METRO tightens requirements on fruit/veg residues, <http://www.planetretail.net/NewsFeed/NewsFeed.asp>

Reardon, T., 2006. The rapid rise of supermarkets and the use of private standards in their food product procurement systems in developing countries. In Ruben, R., Slingerland, M. and Nijhoff, H. (eds.), *Agro-food Chains and Networks for Development*, Dordrecht: Springer; pp.79-106.

Reardon, T. Berdegue, J.A., Echánove, F., Cook, R., Tucker, N., Martínez, A., Medina, A.M., Hernández, R., and Balsevich, F., 2007b. *Supermarkets and Horticultural Development in Mexico: Synthesis of Findings and Recommendations to USAID*, East Lansing: Michigan State University.

Reardon T., Henson S., and Berdegue J.A. 2007a, Proactive fast-tracking' diffusion of supermarkets in developing countries: implications for market institutions and trade, *Journal of Economic Geography*, **7**(4), 1-33.

Reardon, T., Barrett, C.B., Berdegue, J.A. and Swinnen, J.F.M., 2009. Agrifood Industry Transformation and Farmers in Developing Countries, *World Development*, **37**(11), 1717-1727.

Škrbić, B. and Predojević, Z. 2008. Levels of organochlorine pesticides in crops and related products from Vojvodina, Serbia, *Archives of Environmental Contamination and Toxicology*,

54(4), 628-36.

Statistical Office of the Republic of Serbia, 2004. *Agricultural Census: summary of main findings*, Belgrade.

Statistical Office of the Republic of Serbia, 2009. *Statistical Yearbook 2009*, Belgrade.

Statistical Office of the Republic of Serbia, 2010. *External Trade Statistics*, Belgrade.  
<http://webrzs.stat.gov.rs/axd/en/spoljna/indexsp41.php?ind1=0> (last accessed 15th November 2010)

Swinnen, J.F.M. and Maertens, M., 2007. Global supply chains, standards and the poor: some conclusions and implications for government policy and international organisations. In Swinnen, J.F.M. (ed.), *Global supply chains, standards and the poor*, Wallingford: CABI, pp.259-266.

UNECE, 2002. *Yugoslavia: Environmental Performance Review*, United Nations Economic Commission for Europe.

Vogel, D., 1995. *Consumer and Environmental Regulation in a Global Economy*, Cambridge: Harvard University Press.

World Bank, 2006. *Supporting Serbia's Agricultural Strategy*, Washington D.C. Report No.37825-YF

**Table 1: Distribution of survey respondents by farm size**

Farm size Band	Number of farms in sample	% of sample	% of farms in each size band according to the Agricultural census
Up to 1 ha	17	10.3	24.9
1.01 – 3 ha	29	17.6	32.0
3.01 – 5 ha	46	27.9	18.0
5.01 – 8 ha	36	21.8	13.6
8.01 – 10 ha	11	6.7	5.0
10.01 – 15 ha	15	9.1	4.1
Greater than 15 ha	11	6.7	2.3
Total	165	100.0	100.0

Source: survey data and Statistical Office of the Republic of Serbia (2004)

**Table 2: Water use by farmers requiring a permit / licence for extraction**

	Number of farmers reporting use without appropriate permit / licence	Number with permit / licence for extraction
River or stream extraction	24	6
Bore hole	19	6
Natural spring /wells	15	1
Mean farm size (ha)	6.21	6.77

Source: survey data

**Table 3: Farmers' opinion of the effectiveness of the Serbian regulatory system in relation to agricultural standards.**

Statement	Rating of agreement / disagreement with statement (% of all responses)				
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Water pollution is effectively controlled by the state	50.3	32.7	10.9	4.8	1.2
The use of agri-chemicals is effectively controlled	46.1	35.2	13.9	3.6	1.2
Farm pollution is effectively monitored	40.0	33.3	23.0	3.0	0.6
Farm polluters are fined when they break the law	42.4	21.8	31.5	2.4	1.8

Source: survey data

**Table 4: A comparison of the presence of private environmental standards by buyer type.**

Private environmental standard employed by main buyer	% of those who sell to domestically owned main buyer without contract (n=130)	% of those who sell to domestically owned main buyer with a contract (n=27)	% of those who sell to a foreign owned buyer with contract (n=8)	% of total sample (n=165)
Rejects produce in poor condition	0.0	70.4	100.0	16.4
Insists that pesticide log is kept	0.0	40.7	87.5	10.9
Tests for contaminants	1.5	29.6	87.5	10.3
Rejects output with contaminants / residues above threshold level	0.8	29.6	87.5	9.7
Specifies what agri-chemicals can be used	0.0	7.4	87.5	5.5
Tests quality of water used	0.6	3.7	87.5	4.3

Source: survey data

**Table 5: Comparison of the rating of potential problems by buyer type**

	Domestic buyer without contract	Domestic buyer with contract	Foreign buyer contract	F-test
Low prices received	4.54	4.40	4.14	1.24
Meeting the quality standards of buyers	4.45	4.07	4.13	2.92*
Price fluctuations	4.22	3.93	4.00	2.64*
Access to inputs	4.06	3.89	3.25	3.11**
Shortage of water (quantity issue)	3.89	3.69	3.75	0.33
Delayed payments from buyers	2.23	3.63	3.71	14.88***
Interest rates	2.94	3.54	3.38	1.93
Quality of water used for FFV	3.03	3.00	3.25	0.12
Mean farm size (ha)	5.76	6.07	16.46	17.33***

\* Significant at the 10% level, \*\* significant at the 5% level, \*\*\* Significant at the 1% level.

Source: survey data

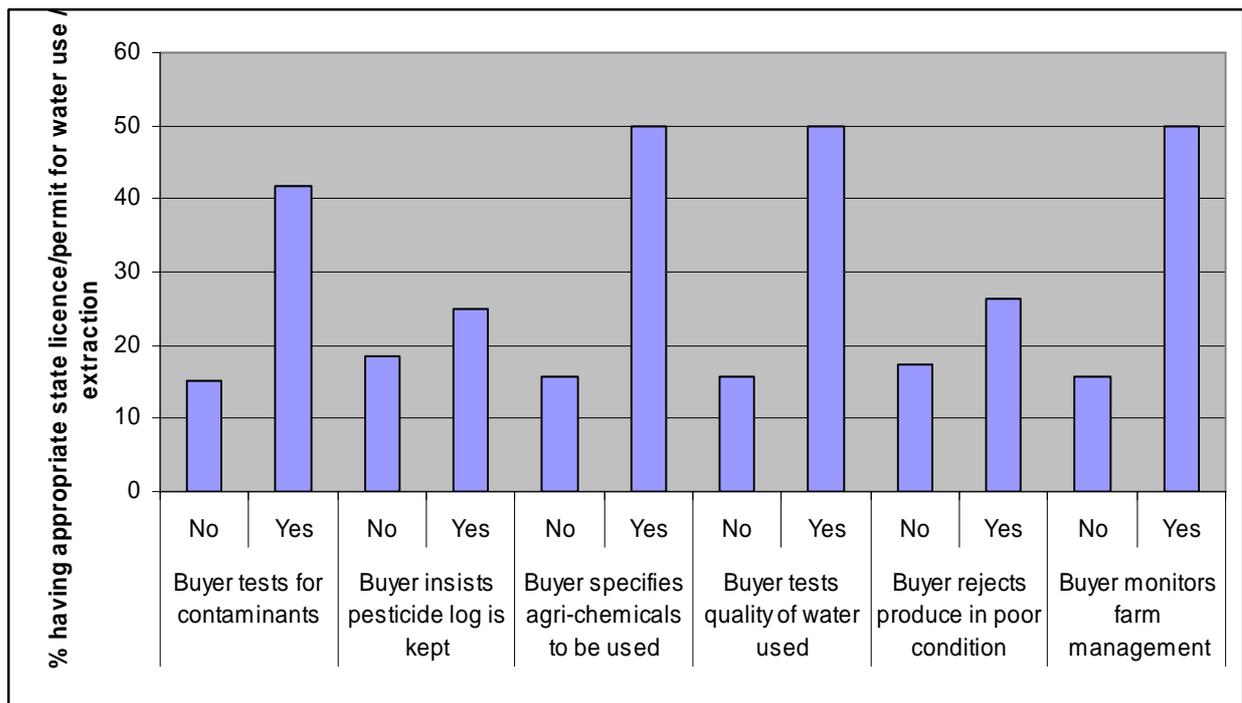
**Table 6: Farmers' opinions of the effectiveness of the Serbian regulatory system by buyer type**

	Mean score (1= strongly disagree, 5= strongly agree)			F-test
	Domestic buyer without contract	Domestic buyer with contract	Foreign buyer contract	
Water pollution is effectively controlled by the state	1.62	2.15	2.25	5.12***
The use of agri-chemicals is effectively controlled	1.66	2.37	1.75	7.27***
Farm pollution is effectively monitored	1.81	2.44	1.75	6.14***
Farm polluters are fined when they break the law	1.85	2.74	1.75	9.97***

\*\*\* Significant at the 1% level

Source: survey data

**Figure 1: Relationships between use of private environmental standards and possession of appropriate state licence / permit for water use / extraction**



Source: survey data