How the European Union works: Theory and empirical evidence from EU agricultural policy

Christian H.C.A. Henning*and Eva Krampe†

September 30, 2010

Paper prepared for presentation at the PEIO, Zurich, January 27-29, 2011 and also for publication in the Review of International Organizations

Abstract

In this paper we propose a theoretical model of agricultural policy decision-making that allows the comparison of policy outcome under the EU-system with the counterfactual policy outcomes that would be observed under a parliamentary and a presidential regime, respectively. In particular, we demonstrate that in the EU-6 national member states have a strong incentive to formulate CAP under the so-called Luxembourg Compromise, i.e. to form a stable ex ante coalition in the council excluding the European commission granting each other agenda setting power over nationally important agricultural commodities. This induces high agricultural protection under the Luxembourg Compromise. However, with continuing enlargement this incentive is increasingly attenuated. Thus, we show that in the EU-15 council member prefer to decide CAP under universalism, i.e. the council decides under qualified majority on a proposal of the Commission. Using a dynamic panel estimation based on time-series cross-country data for 60 democracies since 1961 both aspects, the general increase of agricultural protection under the EU-system and the decreasing agricultural protection after the Single European Act in 1986 in the European Union, could be confirmed empirically.

Keywords: Political economy of the EU, comparative politics, common agricultural policy, legislative norms

*Department of Agricultural Economics, Christian-Albrechts-University of Kiel, Germany, Tel.: +49-431-8804453, Fax: +49-431-8801397, chenning@ae.uni-kiel.de

†Department of Agricultural Economics, Christian-Albrechts-University of Kiel, Germany, Tel.: +49-431-8802146, Fax: +49-431-8801397, ekrampe@ae.uni-kiel.de

1 Introduction

In the literature of comparative politics the European Union is generally described as an unique political system (see for example Hix, 1999). The uniqueness of the EU-system not only applies to its emergence out of a process of voluntary economic and political integration between nation-states of western Europe, but also or even especially because of its unique political system leading to a specific way of governance that does not compare to standard political systems, i.e. parliamentary and presidential democracies, respectively. Accordingly, scholar of comparative government as well as politicians around the world are interested in "How the European Union works".

However, most scholars of comparative politics have described fundamental features of the EU constitutions, but they have mainly focused on political phenomena, failing to study how constitutional rules shape economic policies (Hix, 1999; Napel, 2006; Tsebelis, 1994). In contrast, political economists have studied the socio-economic determinants of EU-policy choices, but rarely took political institutions into account.

A good case in point to study the specific impact of the EU-system on policy outcomes is certainly the Common European Agricultural Policy (CAP), which until today is the most important EU-policy covering roughly 50% of the EU-budget. Since its establishment in the 60tees the CAP has been criticized as an extremely protectionist policy. Empirical analyses underline the special impact of the EU-system on agricultural protection reporting a significant and positive EU-dummy in their econometric analyses of cross-country agricultural protection rates (Honma and Hayami, 1986; Thies and Porche, 2007).

Although these empirical studies generally agree that the specific constitutional set-up of the EU is a main factor explaining extreme high agricultural protection levels, there does hardly exist a comprehensive political economy theory that explains this empirically observed effects.

In particular, most scholars intuitively explain high EU protection levels with the so called restaurant table effect (de Gorter et al., 1998; Bilal, 2000; Thies and Porche, 2007). In a system of supranational policy formulation with financial solidarity, net beneficiaries thus tend to prefer higher levels of support than they would in a system of national policy formulation: sharing the bill in a restaurant while allowing individual meals to be ordered creates strong incentives to consume too much. Similarly, the principle of financial solidarity creates individual incentives to boost farm support. Conversely, net contributors tend to prefer lower levels of protection. Since every member state is a net beneficiary for at least some agricultural commodities, and ministries of agriculture are usually more interested in receiving support on commodities for which they are net beneficiaries than in restraining support to commodities for which they are net contributors, package deals are commonly observed whereby each member state receives the support demanded. France, for example, tends to demand high levels of support for wheat and accepts, in return, demands from Greece and Spain for substantial support on olives and sheep.

But since the restaurant table effect also applies to all multilevel systems, e.g. the USA, India and Canada, figure 1 illustrates the striking observation that agricultural

protection in the EU clearly exceeds agricultural protection observed in other multi-level governed states.

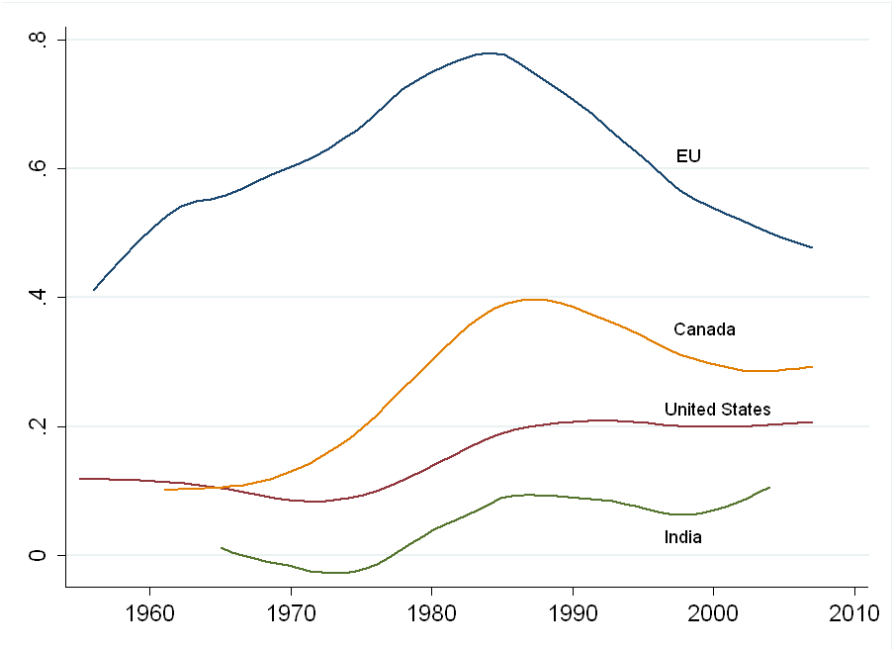

Figure 1: Nominal rate of assistance to agriculture in the US, India, Canada and European Union

Hence, the restaurant table effect is obviously not a sufficient theoretical explanation for empirically observed high EU-protection levels. Moreover, being a special form of pork barrel politics the restaurant table effect involves package deals, i.e. informal political exchange, and there hardly exist political economy approaches that explicitly model informal political exchange. Therefore, overall, it is fair to conclude that comprehensive theoretical political economy approaches do not exist yet that explain how and why the specific governmental system of the EU implies significantly higher agricultural protection levels when compared to parliamentary or presidential regimes.

Moreover, existing empirical analyses apply simple regression techniques using cross-country data of EU- and Non-EU countries neglecting various estimation problems endemic to time-series cross-section data.

In this context we propose a theoretical model of agricultural policy decision-making that allows the comparison of policy outcomes under the EU-system with the counterfactual policy outcomes that would be observed under a parliamentary and a presidential regime, respectively. Further, we identify specific cooperative legislative bargaining procedures that allow for a realization of informal political exchange. Technically, self-enforcing cooperative legislative decision-making procedures correspond to Weingast's concept of legislative norms promoting, at least from the viewpoint of legislators collective efficiency of legislative decision-making (Weingast, 1979). We suggest different leg-

islative norms reflecting different degrees of cooperation among an ex ante fixed majority coalition. In particular, the ex ante fixed majority coalition excludes the Commission, i.e. council members unanimously determine agricultural policy. This procedure corresponds to the so-called Luxembourg Compromise. However, the fixed ex ante coalition might also include the Commission, i.e. the council actually decides under qualified majority granting agenda setting power to the European Commission.

We demonstrate that agricultural policy outcomes vary systematically across informal legislative bargaining procedures and for each bargaining procedure with the number of EU-member states. Accordingly, legislators' incentives to adopt different cooperative legislative bargaining procedures vary systematically with the number of EU-member states. In particular, in the EU-6 national member states have a strong incentive to

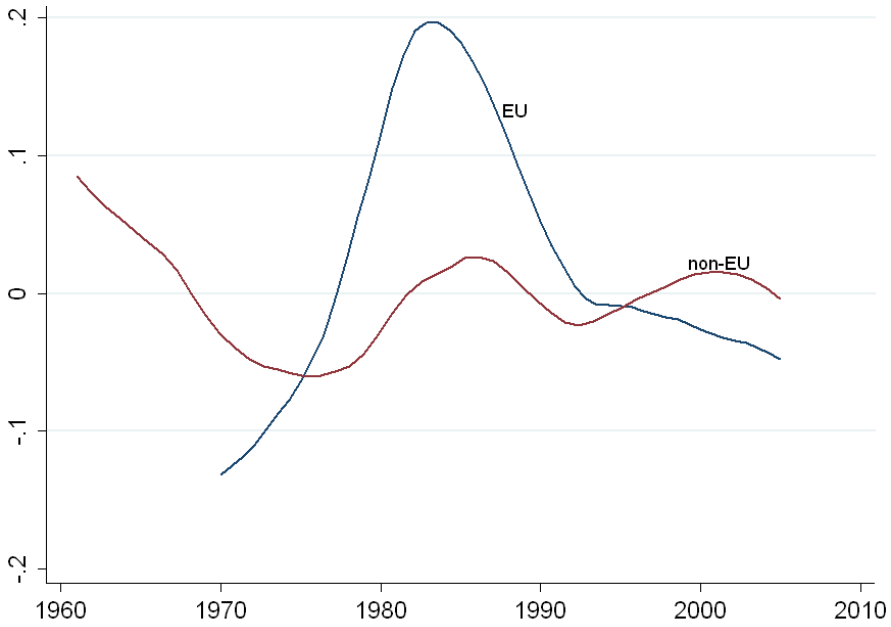

Figure 2: The development of agricultural protection in the EU

Notes: The figure plots residuals from a fixed effect regression of NRA on standard socio-economic controls averaged by year for the EU and non-EU members. For more information see section 4 and 5.

formulate CAP under the so-called Luxembourg compromise, i.e. to form a stable ex ante coalition in the council excluding the European commission granting each other agenda setting power over nationally important agricultural commodities. The Luxembourg compromise leads to extremely high agricultural protection levels. Interestingly, these incentives vanish with an increasing number of member states. Accordingly, in the EU-15 and especially in the EU-27 national council members observe strong incentives to grant agenda setting power to the Commission as foreseen in the consultation procedure determined in the EU-constitution, which results in a significantly lower agricultural

protection when compared to the Luxembourg compromise.

However, even under the consultation procedure legislative bargaining in the EU-system implies significantly higher protection levels when compared to counterfactual agricultural protection levels derived under a parliamentary or presidential regimes, respectively. Thus, our theory not only predicts higher protection levels under the EU-system, but furthermore the specific dynamic development of this effect as can be seen in figure 2. Driven by enlargement agricultural protection under the Luxembourg Compromise continuously increased starting from the late 60tees until the early 80tees when unsatisfactory high protection resulting under the Luxembourg compromise finally triggered a switch of the governmental regime to actual application of qualified majority voting in the council under the consultation procedure in 1986 (Hix, 1999, see also). This regime switch induces significant agricultural policy reforms resulting in a sharp decline of protection levels.

The remainder of the paper is organized as follows. In section 2 and 3 we derive our theoretical model. Section 4 and 5 provide empirical evidence based on cross-country time-series analyses covering 60 countries for the period ranging from 1961-2005. In particular, section 4 describes the data and applied empirical estimation strategy, while in section 5 main estimation results are discussed. Section 6 summarizes our main conclusions and discusses future research.

2 Modeling agricultural policy decision-making under different governmental regimes

We define a legislative system as a finite set of political agents, N, where $i = 1, \ldots, n$ denotes a generic element of the legislative system. Within the legislative system specific institutions, i.e. the government, G, and parliament, P are defined as specific subsets of N.

Furthermore, it is a characteristic structural arrangement of democratic legislative systems that both government and parliament are separated into further subunits, i.e. governmental departments or ministries and committee systems, respectively. Accordingly, we define a family of sets (G_k) as a department structure of the government, if it covers G, and we define the family of sets (C_j) as a committee system of the parliament if it covers P. According to the division-of-labor argument, different committees and governmental departments are usually responsible for different policy domains (Shepsle, 1979). In particular, we denote C_A as the agricultural committee.

The legislative process in democratic systems typically begins when the government submits a bill to the parliament (although in most democratic systems members of the parliament can initiate legislation if there is no proposal of the government).

Legislative consideration of a bill then begins in a committee where amendments might be made before the report to the floor. On the floor, there is a final vote on the entire bill, where additional amendments might be submitted or not.

To analyze the impact of the organization of legislative decision-making on agricultural protection, we can focus on the interaction between the government, G, the agricultural

committee, C_A, and the floor, F. Note that in general government, floor and the agricultural committee consist of multiple members. For notational convenience we denote $\alpha \in A$ as the agricultural policy outcome and $U_i(\alpha)$ as agents' preferences regarding policy outcomes. A is a convex compact subset of the m-dimensional cube $(0,1)^m$, where m denotes the number of agricultural commodities. α_r is the r's component of α and denotes the protection level of the commodity j. $\alpha_r = 0$ implies no protection, while $\alpha_r = 1$ corresponds to some maximal protection level for commodity r.

Agents' policy preferences can be represented by the following separable spatial utility function:

$$U_i(\alpha) = -\sum_r \beta_{ir}(Y_{ir} - \alpha_r)$$

Y_{ir} denotes the ideal point of legislator i, i.e. Y_{ir} is the maximum of $U_i(\alpha_r, \bar{\alpha}_{-r})$.

For simplicity we assume in the following that according to formal constitutional rules protection levels are separately decided for each agricultural commodity r. [1]

2.1 *Parliamentary systems*

It has been nicely demonstrated by Huber (1996) as well as Diermeier and Feddersen (1998) that parliamentary systems are characterized by a stable ex ante majority coalition built among legislators where legislative decision-making occurs solely within this majority coalition. The rational of ex ante majority coalition building correspond to the fact that this coalition at least weakly increases the utility of all majority members when compared to their utilities derived under a default outcome $\bar{\alpha}^o$ resulting under non-cooperative behavior of legislators. In particular, ex ante fixed parliamentary majorities are able to guarantee their members higher utilities due to additional rent legislators realized from being part of a stable majority (Huber, 1996).

Following Henning and Struve (2007) we suggest a rather simple legislative majority bargaining game that captures the essential characteristics of legislative bargaining in parliamentary systems, that is, the existence of a stable ex ante majority coalition and proposal power of the government (Diermeier and Feddersen, 1998). To this end, we can concentrate on the prime minister, PM (representing the government G), and her majority in the parliament, M. M is a finite subset of P and g is a generic element of M. Following Huber (1996) we assume that the Prime Minister's majority is ex ante identifiable. In general, M could correspond to a multi-party coalition or a single majority party.

The model of legislative bargaining in parliamentary systems has two stages. At the first stage, we model the default policy outcome α^o.

According to their separated spatial policy preferences each political agent desires to achieve policy outcomes that are as close as possible to her ideal position y_i. Obviously, assuming protection levels are decided separately for each agricultural commodity r, implies that for each decision the well-known median voter theorem applies, i.e. the unique

[1] Please note that as matter of fact in most countries including the EU agricultural protection levels are decided in separate legislative acts for each commodity. However, this assumption is not essential for our theoretical results, but rather make analyses more traceable.

equilibrium outcome of the non-cooperative legislative decision-making game neglecting any ex ante coalition building is the dimension by dimension median, i.e. the vector of ideal points of the corresponding floor medians resulting for each commodity r. (Black, 1958).

At the second stage the bargaining improving legislators utility derived under the default outcome within the majority M occurs. In detail we assume two steps. At a first step the PM proposes a policy, v_G, to her parliamentary majority and announces side payments γ being paid to the majority in case it admits the governmental proposal. Regarding content, we interpret these side payments as rent the PM can pay to the majority due to specific formal legislative procedures, e.g. issuing a confidence vote, or informal procedures, i.e. the possibility to generate favors in terms of political career for party members. In this paper, we are not specifically interested in modeling exactly how the PM can generate rent valuable to her majority, but generally subsume this under the term party or coalition discipline, that is, exerted by the PM. In fact, the specific procedures for exerting party or coalition discipline vary across political systems. Our major point is that these procedures allow the PM to extract political favors from its majority and that is what we capture, introducing some party discipline in our simple modeling strategy[2].

At the second stage each individual majority member can decide whether or not to accept the governmental proposal. If all majority members accept the governmental proposal, the proposed policy, v_G, is the final legislative decision, and all majority members receive the announced rent. Otherwise, the default policy α^o is the legislative decision and no rent is paid.

We assume that legislators value the rent γ offered by the prime minister, i.e. overall we assume that legislators maximize the sum of actual rent, γ, and the utility derived from policy, captured by the utility function $U_g(\alpha)$:

$$u_g = U_g(\alpha) + \gamma \tag{1}$$

Under these assumptions the legislative majority bargaining game has a unique subgame perfect Nash equilibrium, where α^{par*} denotes the equilibrium outcome that is characterized in *proposition 1.*

Proposition 1: Assuming an m-dimensional agricultural policy choice α, there exists a unique subgame perfect Nash equilibrium for our legislative majority bargaining game defined above. The equilibrium outcome, α^{par*}, depends on the rent, γ, the default policy outcome, α^o, and the policy preferences of the PM and the majority members. In particular, the following holds:

(i) In equilibrium agricultural policy choice, α^{par*}, results from the following maximization [3]:

[2] Note further that we assume that at this stage the PM can commit to paying the rent. However, this assumption is not necessary; in a richer modeling set-up including the specific procedures it is possible to get essentially the same result without assuming this kind of commitment.

[3] Note that the maximization problem always has a unique solution, as long as the utility functions of legislators are strictly concave. Note that all sets A^g are compact and convex subsets of A.

$$\begin{aligned} &\alpha^{par*} = \underset{\alpha}{Max} \quad U^{PM}(\alpha) \quad s.t.\ \alpha \in \bigcap_{g} A^g \\ &with \quad A^g = \{\alpha \in A | \, U^g(\alpha) + \gamma \geq U^g(\alpha^o)\} \end{aligned} \tag{2}$$

The proof of *proposition 1* is straightforward and thus is omitted here.

Interestingly, if the rent, γ , is sufficiently large or if legislators' preferences are sufficiently homogeneous, the final agricultural policy outcome corresponds to the ideal point of the prime minister. Hence, under this condition our model corresponds to pre-election politics models which generally assume that governmental policy simply corresponds to political preferences of the party leader (becoming the omnipotent head of government after elections). However, if party discipline, i.e. the rent γ, is not sufficiently high or analogously, policy preferences of the PM and her parliamentary majority are sufficiently heterogeneous, agricultural policy outcome is no more fully determined by the PM's policy preferences. In contrast, under this assumption policy outcome is solely determined by the intersection set of the subsets A^g, i.e. the policy preferences of the majority member, the majority rent, γ, and the default policy α^o.

However, before we drive actors' policy preferences we first derive a model of legislative decision-making for presidential systems and the EU-system.

2.2 *Presidential systems*

In contrast to parliamentary systems presidential systems are not characterized by a stable ex ante coalition or legislative cohesion. However, presidential systems are characterized by more dispersed proposal powers, where proposal power over specific policy domains resides with corresponding parliamentary committees (Persson and Tabellini, 2002). In particular, we assume that the agricultural committee exerts agenda setting power for agricultural subsidies, α_r.

Accordingly, to model legislative bargaining in presidential systems on agricultural subsidies we focus on the floor median, F and the commodity specific median of the agricultural committee, C_A^r (Weingast et al., 1981; Krehbiel, 1991; Henning et al., 2004). on agricultural subsidies we focus on the floor median, F and the commodity specific median of the agricultural committee, C_A^r (Weingast et al., 1981; Krehbiel, 1991; Henning et al., 2004).

In essence legislative procedure starts with the committee submitting a policy proposal, v_r, to the floor and the floor chooses the final policy based on the committee proposal. Policy choice in the floor can be regulated by different rules granting different agenda setting power to the committee vis-avis the floor. For example, in the US-system the floor can operate under the close or open rule. Under the close rule the floor can only choose between the committee proposal and the status quo, while under the open rule the floor can make an amendment to the committee proposal and select among amended proposals. (Weingast et al., 1981; Krehbiel, 1991). We assume in the following that the floor operate under the close role granting maximal agenda setting power to the floor, i.e. the floor can approve the committee proposal or not. In the latter case the status quo

policy, SQ_r, remains. Let $U_F(\alpha_r, \bar{\alpha}_{-r})$ denote the policy preferences of the floor median regarding subsidization of the agriculture commodity r.

By our constitutional assumptions the decisions on subsidizing agriculture commodities can be considered as separate legislative bargaining games. As we show in *proposition 2* below each game has a unique subgame perfect Nash equilibrium, where α^{pre*} denotes the equilibrium outcome that is characterized in *proposition 2*.

Proposition 2: Assuming an m-dimensional policy choice α, there exists a unique subgame perfect Nash equilibrium for our legislative bargaining game in a presidential system as defined above. The equilibrium outcome, α^{pre*}, depends on the default policy outcome, $SQ = (SQ_1, .., SQ_r, .., SQ_m)$, and the policy preferences of the corresponding commodity specific committee (C_r) and floor medians (F_r). In particular, the following holds:

(i) In equilibrium policy choice, α^{pre*}, results from the following maximization [4]:

$$\begin{aligned} &\alpha_r = \underset{\alpha_r}{Max} \quad U^{C_r}(\alpha_r, \alpha_{-r}^{pre*}) \quad s.t.\ \alpha_r \in A^{F_r} \\ &with \quad A^{F_r} = \left\{ \alpha_r \in (0,1) | \, U^{F_r}(\alpha_r, \alpha_{-r}^{pre*}) \geq U^{F_r}(SQ_r, \alpha_{-r}^{pre*}) \right\} \\ &\alpha^{pre*} = \left\{ \alpha_r^{pre*} \right\} \end{aligned} \tag{3}$$

Obviously given the equilibrium policy choices, α_r^{pre*}, of the subgames overall policy choice in presidential systems results as: $\alpha^{pre*} = \left\{ \alpha_r^{pre*} \right\}$.

Given the assumption of separable preferences the proof of *proposition 2* is straightforward and thus is omitted here.

2.3 Legislative decision-making in the EU-system

Since the establishment of the CAP in the early 60tees, the CAP has always been decided according to the same constitutional rules, the so-called consultation procedure.

Since its' foundation CAP has always been formally decided under the Consultation procedure according to the treaty (Hix, 1999).

In essence, according to the consultation procedure the council decides under qualified majority on the policy proposal of the European commission. If a qualified majority of council members accepts the commission's proposals it is the new policy, otherwise the council can unanimously accept any amendment of the commission proposal. If no proposal is approved the status quo policy remains.

Although the EU-parliament formally also participates in CAP decision-making under the Consultation procedure, members of the EU-parliament become dummy players in legislative bargaining, because these are never a decisive member of a winning coalition.

[4] Note that for each commodity the maximization problem is independent of the solution of the other commodities, since we assume separable policy preferences. Note further that even relaxing the assumption of separable policy preferences a solution of the supergame still exists. However, this might not be unique (Shepsle, 1979). Given the policy choices for other commodities the maximization problem always has a unique solution for each commodity, as long as the utility functions of legislators are strictly quasi concave. Note that all sets A^{F_r}, A^{C_r} are compact and convex subsets of A.

Therefore legislative bargaining in agricultural policy in the EU-system only involves the agricultural council, C_A, and the European commission, G^C.

To understand the logic of the consultation procedure we define the following extended open rule procedure (γ_{EU}:

1. The commission,G^C, formulates a proposal, v_{G^C}.

2. Based on the proposal of the commission each member of the council can propose an individual proposal,v_g $g \in C_A$, she wishes and the committee selects one proposal out of the set of these individual proposals. The selection is done according to the following voting procedure.

   i The set of individual proposals is randomly ordered. According to this random order, the committee votes pairwise on made proposals. Within a vote, the lower ordered proposal wins if no qualified majority M1 exists that prefers the higher ordered proposal. The winner of a pairwise vote will be put against the next ordered proposal until no proposal is left.

   ii In a second step, the selected proposal is put vis-à-vis the governmental proposal, v_{G^C}, in a majority vote M2. If a majority M2 prefers this proposal, it is the winner proposal, otherwise the government proposal is the winner proposal.

3. The winner proposal of the second step is put vis-à-vis the status quo under a majority vote M1. The winner proposal will be the final committee proposal, if it defeats the status quo under M1, otherwise the status quo will be the final committee proposal.

Please note that under the consultation procedure the majority M2 always corresponded to unanimity, while the qualified majority M1 has been changed with EU-enlargement. Roughly qualified majority M1 corresponds to 71 percent of total votes in the council. However, member states have different votes, e.g. in the EU-15 total sum of council votes was 87, where national votes ranged from 2 (Luxembourg) to 10 (Germany, France, United Kingdom and Italy) and a qualified majority needs at least 62 votes. In the EU-27 total council votes are 321 ranging from ?? to ??? and QM is defined by more than 232 votes.[5]

As we show in *proposition 3* below each EU-game has a unique subgame perfect Nash equilibrium, where α^{EU*} denotes the equilibrium outcome that is characterized in *proposition 3.*

Proposition 3: Assuming an m-dimensional policy choice α, there exists a unique subgame perfect Nash equilibrium for our legislative bargaining game in the EU-system under the consultation procedure as defined above. The equilibrium outcome, α^{EU*}, depends on

[5] According to the treaty the consultation procedure is in fact more complex than described above, e.g. specific additional rules like a specific threshold of member states apply to characterize a qualified majority. However, in essence qualified majority results from national council weights as described above.

the status quo, $SQ = (SQ_1, .., SQ_r, .., SQ_m)$, and the policy preferences of the council members and the commission, respectively. In particular, the following holds:

(i) In equilibrium policy choice, α^{EU*}, results from the following maximization [6]:

$$
\begin{aligned}
&\alpha_r^{EU*} = \underset{\alpha_r}{Max} \quad U^{G^c}(\alpha_r, \alpha_{-r}^{EU*}) \quad s.t.\ \alpha_r \in WS_r^C \bigcap PS_r^C \\
&with \\
&WS_r^C = \left\{ \alpha_r \in (0,1) |\, U_g(\alpha_r, \alpha_{-r}^{EU*}) \geq U^g(SQ_r, \bar{\alpha}_{-r}) \forall g \in C_A \right\} \\
&PS_r^C = \left\{ \alpha_r \in (0,1) |\, not\ exists\ \alpha_r^{\#} : U^g(\alpha_r^{\#}, \alpha_{-r}^{EU*}) \geq U^g(\alpha_r, \alpha_{-r}^{EU*})\ \forall g \in C_A \right\} \\
&\alpha^{EU*} = \left\{ \alpha_r^{EU*} \right\}
\end{aligned}
\tag{4}
$$

Given the assumption of separable preferences the proof of *proposition 3* is straightforward and thus is omitted here [7]

2.4 Cooperative legislative bargaining in the EU-system

Although since its' foundation CAP has always been formally decided under the Consultation procedure scholars of EU-politics agree that EU-policies are often decided applying informal legislative bargaining rules. Analogously to parliamentary regimes informal legislative procedures can be best defined via identifying ex ante fixed winning coalitions that commonly agree on a cooperative decision procedure that guarantee's all coalition members a higher pay-off in comparison to the default outcome derived under non-cooperative legilative decision-making. Interestingly, informal legislative procedure applied to the CAP have significantly changed over time (Hix, 1999). In particular, the Luxembourg Compromise is highlighted in the literature as an informal decision-making procedure applied to the CAP until 1986 (de Gorter and Swinnen, 2002). Under the Luxembourg Compromise agricultural policies are decided by the council excluding the commission, i.e. council member form an ex ante fixed coalition that selects policies unanimously.

However, as will be demonstrated in the following in an enlarged EU policy choices derived under the Luxembourg Compromise become extremely inefficient even from the perspective of national council members and hence council members unanimously agree to replace the Luxembourg compromise by a more efficient informal legislative decision-making procedure. We argue that the new legislative decision-making procedure corresponds to Weingast's unitarism, i.e. agricultural policy is decided by a grand coalition comprising all council members and the Commission, where council members grant the Commission some limited agenda setting power.

[6] Note again that for each commodity the maximization problem is independent of the solution of the other commodities, since we assume separable policy preferences. Moreover, there always has a unique solution, as long as the utility functions of legislators are strictly quasi concave. Note that all sets PS_r^C, WS_r^C are compact and convex subsets of A.

[7] All proofs are available from the authors upon request.

To give an intuitive explanation how the Luxembourg compromise as well as EU-unitarism works consider a simplified EU-system comprising of the European commission, C, and only two perfectly homogeneous groups national council members, A and B.

The Common agricultural policy (CAP) that has to be decided corresponds to the subsidy payments to two agricultural commodities, say crop and animal production. In particular, let α_A and α_B, denote the level of subsidy payments for animal and crop production, respectively.

We assume that legislators have spatial policy preferences. Moreover, group A is specialized in animal production, while group B is specialized in crop production. Accordingly, group A prefers a high subsidy level for animals and a low subsidy level for crop production and vice versa group B prefers a high subsidy level for crop and a low for animal production (see figure 3).

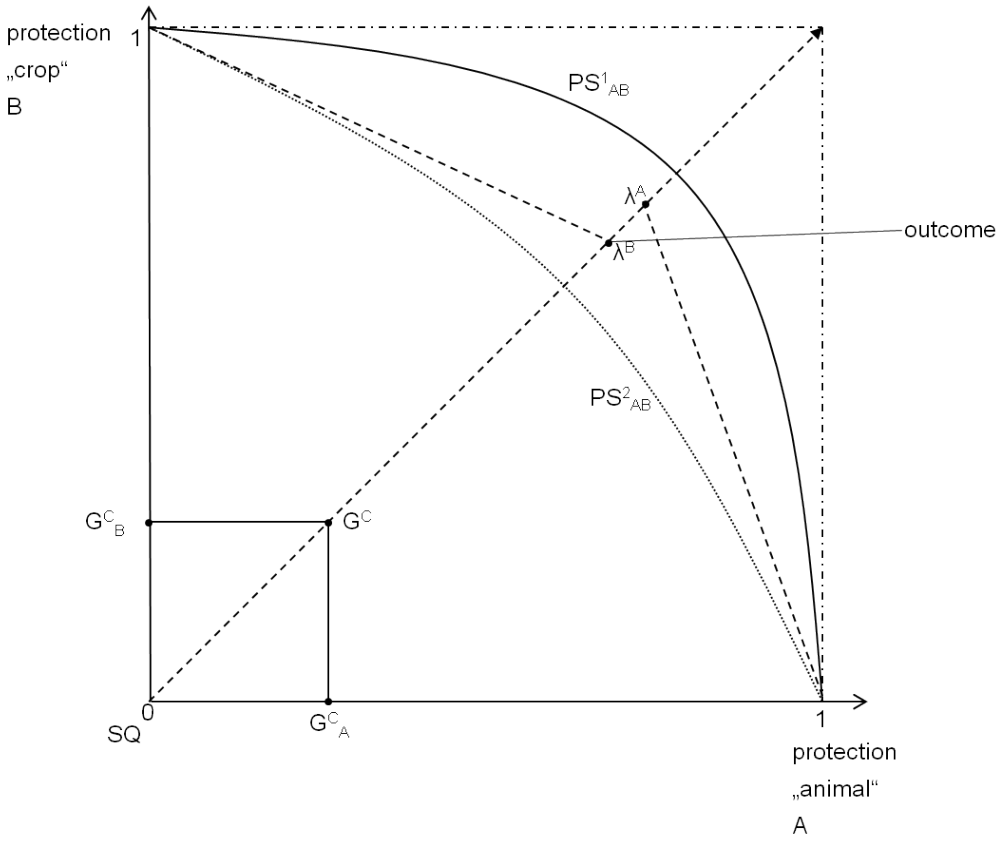

Figure 3: Legislative bargaining in the EU

Without loss of generality we assume that the common ideal point of group A is $Y_A = (0, 1)$ and the common ideal point of B is, $Y_B = (1, 0)$. The European Commission prefers a moderate subsidy level for both commodities, say $Y_C = (0.5, 0.5)$. Assuming further that the status quo policy SQ just equals (0,0) to follows directly from *proposi-*

tion 3 policy outcome of non-cooperative legislative bargaining under the consultation procedure correspond to the ideal point of the commission, i.e. $\alpha^{EU*} = 0.5, 0.5)$.

If we further assume that legislator A and B have high preference intensities for high subsidy payments for their specialized commodity, i.e. $\beta_{AA} >> \beta_{AB}$ and $\beta_{BB} >> \beta_{BA}$, elipsoide indifference curves as indicated in figure 1 result, while legislator C puts the same weight on both policies and hence indifference curves are circles.

Assuming asymmetric preferences intensities over policy dimensions implies that the outcome of the non-cooperative legislative bargaining game is ex ante rather inefficient from the perspective of both council members, A and B. Moreover, give the set of wining coalitions council members A and B could cooperate, i.e. form a fix ex ante coalition they could significantly improve policy outcome.

The problem is to find a procedure that is incentive compatible and guarantees for all council members a collectively Pareto dominant outcome vis-a-vis the outcome of the non-cooperative legislative bargaining game.

A simple and incentive compatible procedure would be that council members grant each other mutual agenda setting power over the policy dimension they prefer most. For example, if group A and B agree that group A has the right to formulate the proposed subsidy level for animal production, while in exchange group B has the right to formulate the proposed subsidy level for crop production and finally the council votes unanimously on the omnibus proposal, the equilibrium outcome assuming perfect knowledge of policy preferences would by (1,1), since both legislators would suggest their ideal subsidy level for the commodity for which they are the agenda setter. That is legislator A and B grant each other mutual agenda setting power over the policy dimensions they prefer most. In essence this procedure of granting mutual agenda setting power corresponds to the political exchange of rights as suggested by Weingast and Marshall (1988).

Obviously, as long as preferences intensities of council members are sufficiently high the outcome of the cooperative bargaining procedure is collectively preferable to all council members, that is group A and B in our simple example.

However, if we assume that legislators' preferences are less intense, for example assume that the Pareto frontier of legislator A and B corresponds to PS^2_{AB} instead of PS^1_{AB} in figure 1, it is easy to see that cooperation among council members via granting mutual agenda setting power is less attractive as it implies an overshooting, while non-cooperative legislative bargaining implies an undershooting.

Obviously, both council members A and B would prefer a lower subsidy level. Please note that in figure 3 there exists a non-empty winset of the point (1,1), where the set is the larger the less preferences intensity are biased, i.e. the more indifference curves are circles.

However, the question is to find a bargaining procedure that is incentive compatible and leads to more efficient outcomes.

Here we suggest the following two step direction-distance procedure which like the Luxembourg Compromise is cooperative bargaining procedure corresponding to a common proposal formulation.

However, in contrast to the mutual agenda setting procedure above, this procedure includes the council and the commission as follows:

1. At a first step the direction towards which the status quo is going to be shifted is determined. In detail, under this procedure legislators agree that the status quo is shifted long the line between the status quo and the outcome of the Luxembourg Compromise. For notational convenience let the latter be denoted by z^E.

In particular, legislator agree to shift the status quo along the line between the status quo and the expected policy outcome,z^E, as indicated in figure ??.

2. Given the direction $Z^E - S$ legislators vote at a second step on the distance, λ, to which the status quo will be shifted. This voting procedure corresponds to the formal voting procedure defined under the consultation procedure, i.e. the commission suggested a distance, which can be accepted by a qualified majority in the council or any other distance can be unanimously accepted by the council.

As regards content the two step common proposal procedure implies that determining the direction at the first step corresponds to legislators common choice of the relative subsidy level of crop and animal production, while the determination of the distance at the second step implies the determination of the total budget allocated for subsidy payments.

Note that once the direction is fixed each legislator has single peaked preferences regarding the distance. Therefore, majority voting at the second stage always delivers a unique solution (see figure 2). To see this please note that legislator k's preferred distance, λ_k, results as:

$$\lambda_k = \underset{\lambda}{Max}\, U(\big[S + \lambda(z^E - S)\big]) = \underset{\lambda}{Max} - \sum_{j=A,C} \beta_{kj}(Y_{kj} - \lambda Z_j^E)^2$$

$$\Rightarrow \quad \lambda_k^* = \frac{\sum_j \beta_{kj} Y_{kj} Z_j^E}{\sum_j \beta_{kj} \left(Z_j^E\right)^2}$$

As long as we assume that the commission prefers the lowest distance compared to all council members, the equilibrium outcome at the second stage will be the lowest preferred distance of the council member who is pivot under qualified majority. In figure 2 this is council member B.

Finally, please note that in general the council members could also apply the two stage direction-distance proposal procedure excluding the commission. However, first it would be unclear how council member would unanimously agree/ vote on a specific distance at the second stage. Second, obviously comparing policy outcomes under these two procedures neither would be Pareto dominant vis-a-vis the other. Third, the less preferences of legislators are biased towards a specific agricultural commodity the higher are c.p. temptations of council members to transgress, i.e. break mutual agreements with other council members and struck a deal with the commission. Thus, overall the less policy preferences are biased the less stable are any cooperative procedures among council members excluding the commission, thus the only stable cooperative procedures are the one which are ex ante Pareto dominant for all council members when compared to non-cooperative bargaining outcomes, i.e. the ones that explicitly include the commission.

The following propositions 4 and 5 summarize our results regarding the two considered informal legislative bargaining procedures in the EU-system, namely the Luxembourg

Compromise (LC) and the EU-Universalism (U):

Proposition 4: Assuming an m-dimensional agricultural policy choice α, there exists a unique subgame perfect Nash equilibrium for our legislative majority bargaining game under the Luxembourg Compromise as defined above. The equilibrium outcome, α^{LC*}, depends on the non-cooperative policy outcome under the consultation procedure, α^{EU*}, and the policy preferences of the council members. In particular, the following holds:

(i) In equilibrium agricultural policy choice, α^{LC*}, results from the following maximization:

$$\begin{aligned} &\alpha_r^{LC*} = \underset{\alpha}{Max} \quad U^{d_r}(\alpha_r, \alpha_{-r}^{LC*}) \quad s.t.\ \alpha \in \bigcap_g A_{LC}^g \\ &with \\ &A_{LC}^g = \left\{ \alpha \in A \middle| U^g(\alpha_r, \alpha_{-r}^{LC*}) \geq U^g(\alpha^{EU*}) \right\} \\ &d_r = \underset{g}{arg Max} \left\{ g \in C_A \middle| Y_{gr} \right\} \end{aligned} \tag{5}$$

Proposition 5: Assuming an m-dimensional agricultural policy choice α, there exists a unique subgame perfect Nash equilibrium for our legislative majority bargaining game under the EU-Universalism as defined above. The equilibrium outcome, α^{U*}, depends on the non-cooperative policy outcome under the consultation procedure, α^{EU*}, and the policy preferences of the council members and the commission. In particular, the following holds:

(i) In equilibrium agricultural policy choice, α^{U*}, results from the following maximization:

$$\begin{aligned} &\alpha^{U*} = \underset{\alpha}{Max} \quad U^{G^C}(\alpha) \quad s.t.\ \alpha \in \bigcap_g A_U^g \\ &with \\ &A_U^g = \left\{ \alpha \in A^U \middle| U^g(\alpha) \geq U^g(\alpha^{EU*}) \right\} \\ &A^U = \left\{ \alpha \in A \text{ and } \lambda \in R \middle| SQ + \lambda(\alpha^{EU*} - SQ) \right\} \end{aligned} \tag{6}$$

The proofs of *proposition 4* and *5* are straightforward and therefore also omitted here[8].

3 Policy preferences and policy outcomes under different governmental regimes

To derive and compare agricultural policy outcomes derived under different governmental regimes we first need to specify policy preferences of involved political agents.

Regarding the policy preferences of legislators, it is generally assumed these reflect agents' interest in political support by politically responsive interests located in their constituencies (see for example Weingast and Marshall, 1988; Persson and Tabellini,

[8]Of course, the proofs are available from the authors upon request.

2002). Electoral competition induces political agents, at least in part, to represent the interest of their constituents. Since economic importance of the farm sector is not uniformly distributed across constituencies, farm interests also are not uniformly distributed over constituencies. We will derive legislators' and government's policy preferences from a reduced form model of electoral competition which corresponds to an explicit model electoral competition which we fully derive in another paper (Henning et al., 2010; Henning and Struve, 2007). In particular, in the reduce form approach we do not explicitly incorporate electoral rules.

3.1 Deriving endogenous policy preferences

Legislators' policy preferences can be represented by the net gain in their member state g:

$$U_g(\alpha) = S_g(\alpha_j) - \omega_g \sum_{r=A,B} \kappa_g(\alpha_r) \tag{7}$$

, where $S_g(\alpha_r)$ denotes the political support received from subsidizing crop (r=B) and animal production (r=A).

$\kappa_r(\alpha_r)$ denotes the costs of subsidization of crop (r=B) and animal (r=A) production. ω_g denotes the cost share of the constituency of legislator g, which for a national council member corresponds to the EU-budget share of her national member state, which according to the financial rules of the CAP corresponds to the share of national GDP in total GDP of all EU-member states. For simplicity we assume the following support and cost functions for each member states:

$$S_g(\alpha_j) = \sum_{r=A,B} t_{gr}\delta_g\alpha_r^{\sigma} \; \sigma \leq 1$$
$$\kappa_g(\alpha_r) = \sum_{r=A,B} t_{gr}\alpha_r^{\eta} \; \eta > 1$$

t_{rg} denotes the size of the crop(r=B) and animal (r=A) production sector in country g, e.g. t_{rg} could correspond to agricultural land used for crop and animal production, respectively.

δ_g covers specific characteristics of member states that also have an impact on generation of political support. For example, these characteristics include institutional settings of the electoral system, average national farm size, the organization of farm and non-farm interest, etc. [9]

In contrast to national council member the relevant constituency of a supranational institution, i.e. the European Commission corresponds to all EU member states. Accordingly, the policy preferences of a supranational legislator,$i = G^C$, are represented as follows:

[9] A detailed theoretical and empirical analysis of economic and institutional factors determining political support of rural and urban population is provided for example by Henning et al. (2007, 2010) or Thies and Porche (2007); Park and Jensen (2007); Olper and Raimondi (2008).

$$U_{G^C}(\alpha) = \sum_r \sum_g t_{gr}\delta_g \alpha_r^{\sigma} - \sum_r \sum_g t_{gr}\alpha_r^{\eta} \tag{8}$$

Hence, we assume that a supranational legislator gets political support form all member states, i.e. from any subsidies paid to national farmers, but also bears total cost of subsidization, i.e. supranational legislators observe a cost share of 1.

As a local approximation legislators preferences can be equivalently expressed by the following spatial utility function:

$$U_i(\alpha) = -\sum_r \beta_{ir}(Y_{ir} - \alpha_r)^2$$

, where agents' g ideal points Y_{gr} correspond to the policy implying maximal support, i.e. it holds:

$$Y_{gr} = \left[\frac{\sigma}{\eta}\delta_g \frac{s_{gr}}{\omega_g}\right]^{\frac{1}{\eta-\sigma}}$$

, where s_{gr} is the production share of constituency g in production of the agricultural commodity r. Obviously, legislator k's preferred subsidy level for a agricultural commodity j is the higher the higher the production share, s_{gr} for this commodity and the lower the cost share, ω_g, of his constituency g. Thus, if a country is specialized in crop production it prefers high subsidy for crops and relatively low subsidies for animal production and vice-versa for countries specialized in animal production. Note further that for the Commission both cost and production shares equal 1. Thus, for both agricultural goods the commission takes a middle ground between the high subsidy level preferred by members states specialized in the production of a agricultural commodity and the members stares not specialized in the production of this commodity.

However, even within in the crop and animal group, respectively, some heterogeneity results, e,g, since the absolute size of the agriculture sector varies across member states. Therefore, even within a group preferred subsidy levels vary across group members within a specific range. We assume that within group heterogeneity is low when compared to heterogeneity across groups.

For notational convenience we assume that within the crop group preferred crop subsidy levels increase from member B1 to member B5 and analogously, preferred subsidy levels for animal production increases from member A1 to member A6.

Further, we assume that all members of the crop group prefer the status quo subsidies for animal and vice-versa all members of the animal group prefer status quo subsidies for crops. Moreover, we assume without loss of generality that the original status quo SQ equals (0,0).

Further, interpreting the spatial utility function as a second order Taylor approximation of the original net political support function developed at the maximum results:

$$\beta_{gr} = \frac{\partial^2 S_g}{\partial \alpha_r^2} - \frac{\partial^2 C_g}{\partial \alpha_r^2} = -\left[\sigma\left(1-\sigma\right)\delta_g t_{gr}\alpha_r^{\sigma-2} + \eta\left(\eta-1\right)\sum_g t_{gr}\omega_g \alpha_r^{\eta-2}\right]$$

Assuming without loss of generality that for all legislators the β-parameters are normalized to one the size of β_{gr} determines how national legislator evaluate subsidy payments for the agricultural their member state is specialized in in comparison to budgetary outlays for subsidies paid to agricultural goods their member state is not specialized in, here it holds for $\alpha_r = Y_{gr}$:

$$\frac{\beta_{gA}}{\beta_{gB}} = \left(\frac{s_{gA}}{s_{gB}}\right)^{\sigma-2} \frac{\left[\frac{(1-\sigma)}{(\eta-1)}\frac{\sigma^2}{\eta^2}\delta_g^2\left(\frac{\omega_g}{s_{gA}}\right)^2 + 1\right]}{\left[\frac{(1-\sigma)}{(\eta-1)}\frac{\sigma^2}{\eta^2}\delta_g^2\left(\frac{\omega_g}{s_{gB}}\right)^2 + 1\right]}$$

Please note that for the commission the relative interest in crop and animal subsidies is always 0.5 as long as we assume that the relative electoral bias in favor of farmers is in average of all EU-member states the same for crop and animal farmers, i.e. it holds:

$$\delta_{G^C A} = \frac{\sum\limits_g \delta_g t_{gA}}{\sum\limits_g t_{gA}} = \frac{\sum\limits_g \delta_g t_{gB}}{\sum\limits_k t_{gB}} = \delta_{G^C C}$$

Next we derive the policy preferences of members of the parliament, i.e. $i \in F$.

To do this in a systematic way we introduce a further assumption to capture a different composition of the floor of the parliament when compared to the agricultural council that incorporates the fact that agricultural council members are c.p. preference outlier overrepresenting their national agricultural interests (Krehbiel, 1991).

In general in any country elected legislators represent national agricultural interest to a different degree depending on their election in urban versus rural constituencies. A common feature of industrialized countries is the fact that the majority of parliamentary seats are elected in urban districts and only a minority of parliamentary seats are elected in rural districts, the latter characterized by a share of agriculture above national average and the former by a share of agriculture below national average (Henning et al., 2007).

Further, when it comes to determine structural positions in elected institutions, e.g. governmental departments as well the parliamentary committee's, it follows directly form the political exchange theory of Weingast and Marshall (1988) that legislators representing rural interest have higher incentives to control the agricultural department of the government as well as to control the agricultural committee of the parliament. Introducing a national partition of floor members, i.e. denote $F_g, g \in C$ a family of national subsets covering P, then the subset F_g includes all members of the parliament belonging to the member state g. Accordingly, consider the commodity specific floor median in regard to any agricultural policy r, F_r, than it follows that this floor median will always represent urban interest.

Hence, the floor median prefers a significantly lower protection level for commodity r when compared to the preferred protection level of his corresponding national council member. Moreover, assuming that the commission represents the interest of an average constituency across all member states, while the floor median F_r represents the median

constituency across all member states which will not be specialized in production of commodity r, it also follows that the commodity specific floor median prefers also significantly lower protection levels when compared to the European commission.

$$\begin{array}{l} \delta_{f_g} \leq \delta_g \forall g \in C_A \; and \; \forall f_g \in F_g \\ \delta_{F_r} < \delta_{G^C r} \quad \forall r \end{array} \tag{9}$$

Accordingly, given eq.(9 political support maximization according to eq. (??) results:

$$Y_{F_r r} < Y_{G^C r} \; \forall r \tag{10}$$

3.2 CAP outcomes under different governmental regimes

Based on *propositions 1-5* The following results can be summarized in *proposition 6* :

Proposition 6: Assuming an m-dimensional agricultural policy space and assuming (spatial) policy preferences of agents are derived from political support maximization as specified above, the follow statements hold true:

i The policy outcome under the formal consultation procedure is always higher or equal when compared to the outcome under a parliamentary system, i.e.: $\alpha^{EU*} \geq \alpha^{par*}$. More over the absolute difference between policy outcomes is the higher the more heterogenous policy preferences among member states.

ii Comparing outcomes under the formal consultation procedure and presidential system, this comparison depends on the relative agenda setting power of the agricultural committee vis-a-vis the floor. In particular, it holds: if and only if $Y_{F_r} - QS_r \leq Y_{G^C r} - Y_{F_r}$ it follows that $\alpha_r^{EU*} \geq \alpha_r^{pre*}$. Moreover, the difference $\alpha^{EU*} \geq \alpha^{pre*}$ increases with the heterogeneity of policy preferences among member states.

iii Comparing outcomes under the formal consultation procedure and the informal Luxembourg Compromise it directly follows that: $\alpha^{EU*} - \alpha^{LC*} \leq 0$, where this difference increases with the heterogeneity of policy preferences among national council members.

iv Comparing outcomes under the formal consultation procedure and the informal EU-universalism it directly follows that: $\alpha^{EU*} - \alpha^{U*} \leq 0$, where this absolute difference decreases with heterogeneity of national council members.

v Comparing outcomes under the Luxembourg Compromise and EU-universalism it directly follows that: $\alpha^{U*} - \alpha^{LC*} \leq 0$, where this absolute difference increases with heterogeneity of national council members.

Proof Part (i) and (ii) follow directly form proposition 1-3 and derived policy preferences of the national member states, the Commission and the commodity specific floor medians assuming some heterogeneity in the agricultural structure across member states, e.g. $s_g A > sgB \forall g \in groupA$ and $s_g B > sgA \forall g \in groupB$.

Analogously, the first statements of parts (iii), (iv) and (v) follow directly from proposition 3-5 assuming some heterogeneity of member states and a status quo policy (0,0).

Thus, only the second statements of parts (iii)-(v) regarding the absolute difference of policy outcomes under different formal and informal EU-regimes and a different degree of heterogeneity of policy preferences across member states remained to be proven.

Generally, this can be done by using comparative static results for eqs. () to () above. However, instead of deriving these comparative statics explicitly, we provide a graphical representation of equilibrium outcomes under different regimes assuming different degrees of heterogeneity. Please note that generally heterogeneity of policy preferences result from heterogenous agricultural sector structures, i.e. the larger the variance or span of the relation $\frac{s_{gr}}{w_g}$, across member states, the larger is c.p. the variance or span of preferred policy positions, Y_{rg} across member states.

Assuming a mean preserving increase of heterogeneity implies that the policy position of the Commission, Y_{GC_r}, remains constant, while the position of the commodity specific floor median, Y_{F_r} decreases and the maximal preferred protection level within the council, Y_{d_r}, increases. Basically, this is graphically described in figure 4. Accordingly, equilibrium outcomes under both parliamentary and presidential regimes decrease ceteris paribus with increased heterogeneity, while the equilibrium outcome of non-cooperative legislative bargaining under the consultation procedure remains unchanged by assumption of a mean preserving increase of heterogeneity. Thus, it already follows that outcomes under a parliamentary regime are always lower or equal to the prefered position of the government, where the latter just result as the outcome under the consultation procdure. Of course, assuming a constant coalition discipline implies that c.p. equilibrium outcome under parliamentarism decrease with heterogeneity, i.e. assuming high heterogeneity it is impossible for the Commission as a supranational government to perfectly discipline her coalition and hence she has to compromise and accept a lower protection level. In contrast, under the consultation procedure the Commission has sufficient agenda setter power vis-a-vis a heterogeneous council to sustain its preferred protection levels as the final policy outcome (see figure 4).

Analogously, the agenda setter power of the agricultural council as a agricultural committee vis-a-vis the floor decreases with increased heterogeneity of policy preferences, since the commodity specific floor medians tend to move towards the corresponding status-quo levels. Accordingly, also for presidential regimes equilibrium outcomes decrease with increased heterogeneity. However, please note that in contrast to a parliamentary regime policy outcomes under presidentialism can result in higher protection levels than preferred by the Commission as the supranational government (see figure ???).

Furthermore, it also follows straightforward from comparative statics of eq. (??) that under the Luxembourg Compromise equilibrium policy outcomes increase with heterogeneity. However, under universalism an inverse u-shape relation between heterogeneity of policy preferences and agricultural protection levels in equilibrium result, i.e. for low levels of preference heterogeneity among national council members an increase of heterogeneity implies an increase of equilibrium agricultural protection levels, while for high heterogeneity just the opposite comparative static effect results (see figure ??).

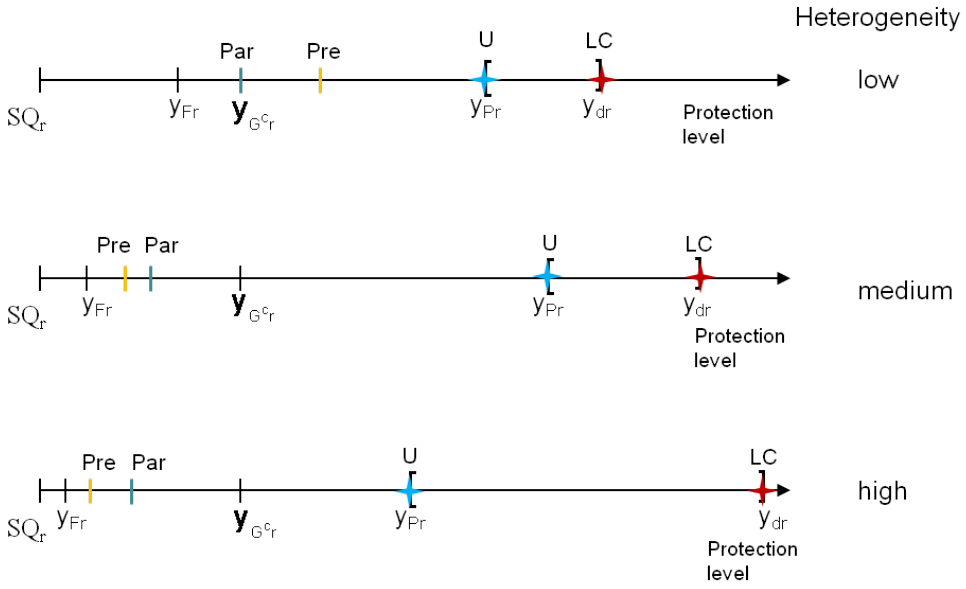

Figure 4: CAP outcomes under different governmental regimes

To understand this relationship intuitively note that increased heterogeneity has an effect on both the preferred protection level regarding the country specific agricultural commodity, Y_{gr_g}, and the relative intensity to receive own high protection levels vis-a-vis the intensity to keep protection levels of other member states commodities at a bay, $\frac{\beta_{gr_g}}{(1-\beta_{gr_g})}$. Accordingly, the more heterogenous policy preferences, the larger is c.p. agents incentives to keep overall protection at a bay. Formally, this follows from the comparative statics of λ_{g*} with regard to increased heterogneity, which is positive for low levels of heterogeneity, but negative for high levels of heterogeneity.

Finally, please note that if heterogeneity is sufficiently high, council members unanimously prefer lower protection levels resulting under universalism when compared to extreme high protection levels received under the Luxembourg Compromise (see figure 4). Note further that the latter becomes extremely inefficient for high heterogeneity, e.g. equilibrium outcome under the Luxembourg Compromise are extremely distant from the Pareto-frontier of the council, while policy outcomes under universalism always lie on the Pareto-frontier of the council.

q.e.d.

Overall, it follows from *proposition 1-6* that initially national council members of the EU-6 preferred policy outcomes derived under the Luxembourg Compromise when compared to the formal consultation procedure. Further, under the application of the Luxembourg Compromise EU agricultural protection levels are significantly higher, when compared to protection levels that would have been derived under a parliamentary or presidential regime, respectively. Since agricultural structures of EU-member states become more heterogenous in an enlarged, agricultural protection increases in an enlarged

EU under the Luxembourg Compromise. However, assuming increasing heterogeneity of member states through continuing enlargements implies that council members unianimously prefer lower protection levels derived under universalism when compared to extremely high protection levels resulting under the Luxembourg Compromise. Thus, a regime switch from the Luxembourg Compromise to the EU-universalism occurred, since this switch is a Pareto-dominant move from the viewpoint of all relevant political agents (council members and Commission) and hence corresponds to a unanimous constitutional preference. Note that it directly follows that this regime switch implies a significant reduction in EU agricultural protection levels. However, it still follows from proposition 1-3 that even under EU-universalism protection levels remain significantly higher when compared to protection levels resulting under a parliamentary or presidential regime.

In essence the EU-system results higher agricultural protection levels when compared to standard national regimes due to the fact that according to the constitutional rules specified under the consultation procedure the agricultural council, i.e. the agricultural committee, commands an extremely high agenda setting power vis-a-vis the floor. Therefore, agricultural preference outlier which naturally are members of the agricultural committee in all governmental regimes have the political power to bias policies in favor of rural and at the expense of urban interest.

4 Empirical evidence

4.1 Data description

The OECD database of Producer Support Estimates is the commonly used data set when analyzing the impacts of political institutions or socio-economic framework conditions on agricultural protection. While this data set suffers from covering a short time period and mainly developed countries, a recently published data set by Anderson and Valenzuela (2008) provides commodity-specific protection measures for about 75 countries since 1955. The *Nominal Rate of Assistance to the agricultural sector* (*NRA*) is calculated as a weighted average of commodity-specific *NRA*s using the undistorted production values of the commodities as weights. Thus, this data set suits perfectly our purpose of deriving new insights on agricultural protection patterns from cross-country analyses (see figure 5 for an overview on covered countries by Anderson and Valenzuela (2008))[10].

Given the fact that our theory focus on the impact of democratic organization of formal decision-making on agricultural protection, we strictly kept our selection of country data out of the available data to consolidated democracies excluding all non-democratic systems. In detail, we used the polity scores provided by the Polity IV data set to classify countries into democracies and autocracies (see database of Marshall et al., 2008).

[10]The NRA was developed under the project "Distortions to Agricultural Incentives" (see www.worldbank.org/agdistortions). In contrast to the concept of the PSE the unit value difference of production between the world and domestic market is expressed as a fraction of the undistorted product value and not as a fraction of the distorted product value. Analogously to the PSE published by the OECD (2001) the NRA includes indirect market interventions, e.g. direct transfer payments, as well as exchange rates distortions.

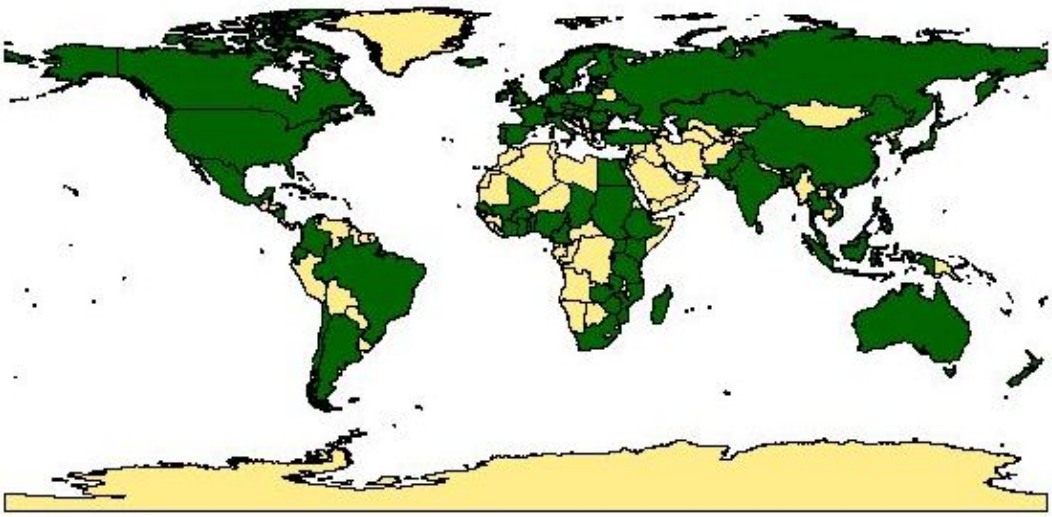

Figure 5: Countries covered by the data set of Anderson and Valenzuela (2008)

Note: The Nominal Rate of Assistance is available for green colored countries

Thus, we use time-series cross-section data which covers 60 countries over the period from 1961-2005[11].

Our main variable of interest is the dummy *EU member* indicating EU membership. With this dummy we are able to address whether agricultural protection is significantly higher when decisions were made on the supranational level. *EU member* switches from 0 to 1 if a country joins the European Union. Since countries might be anticipating the accession in their policy decisions on protection, the dummy even codes the last two years before accession with 1.

Since our theory does not add to existing studies regarding the impact of demographic and economic framework conditions on agricultural protection, macroeconomic control variables will be mainly taken from the literature (see for example Beghin and Kheralah, 1994; Swinnen et al., 2000; Swinnen, 1994; Balisacan and Roumasset, 1987; Olper, 2001; Tyers and Anderson, 1992; Anderson, ed, 2008). These include the initial GDP per capita and GDP per capita growth (*initial_ gdppc*, *gdppcgrowth*) to capture economic development; the logarithm of agricultural share in employment (*emplln*) to account for differences in economic structure and industrialization (Olson, 1965; Swinnen, 1994; Peltzman, 1976); the ratio of the agricultural share in value-added and the agricultural share in employment (*compad*) to proxy comparative advantages in agriculture; arable land per farm worker, *factorend*, to take the relative income of agricultural farmers into account. *tax_ agri* covers the tax collection constraints that governments face especially

[11] Due to data limitations from supplementary data sets, we cannot use all periods covered by Anderson and Valenzuela (2008). A detailed sample overview and country means of all endogenous and exogenous variables used in the regression analyses are presented in table 2 in the appendix.

in developing countries to provide f.e. public goods. The variable is defined as the share of agricultural exports in total merchandise exports. Further, following Beghin and Kherallah (1994) we define *budget* as the net agricultural export per capita in order to account for governmental budget constraints. In particular, budget costs due to agricultural trade policy crucially depend on the country's agricultural net trade position. Additionally, it is well-known that the WTO negotiations influenced agricultural protection in all countries. Thus, we include also a dummy variable *urround* coded as 1 for years after the WTO Agreement on Agriculture in 1994 and 0 for all other years. All used economic and demographic control variables were calculated using data available from the World Bank database of development indicators and the database of the Food and Agriculture Organization of the United Nations (FAOSTAT, 2008; World Bank, 2008).

4.2 Estimation strategy

To assess empirically whether the European decision-making system increases significantly agricultural protection using time-series cross section data, we refer to the following regression model with country-specific effects:

$$NRA_{it} = \alpha + \mu_i + \beta X_{it} + \gamma EU_{it} + \epsilon_{it}, \tag{11}$$

where μ_i denote country-specific effects, X_{it} denotes a set of macroeconomic controls, that were empirically tested to influence protection rates, and EU_{it} denote dummy variables that indicate EU membership or institutional settings specific to the European Union.

Within this baseline specification we model unobserved country heterogeneity by incorporating country-specific effects μ_i that also address partially the problem of serially dependent error terms endemic to time-series cross-section data. Thus, this model provides a valid assessment of the influence of EU-specific institutions on agricultural protection in the context of unobserved unit-heterogeneity. But since a fixed effect model like eq. 11 is not able to estimate efficiently the effect of rarely changing country-specific variables, we tackle the question whether to use fixed effects or not by a cross-validation experiment as proposed by Beck et al. (2001). Therefore we fit regressions with N-1 countries, predict the NRA of the left out country and compute the mean squared forecast error (MSFE) for the left out country. By comparing the country specific MSFEs with the MSFE averaged across the sample, we see if any country is as well predicted by the model than others. For countries that fit the model less well, we implement country dummies and re-estimate equation 11 with a set of country dummies, D_i instead of μ_i.

$$NRA_{it} = \alpha + D_i + \beta x_{it} + \gamma EU_{it} + \epsilon_{it}, \tag{12}$$

Beyond specification issues concerning unobserved country heterogeneity, we need to control for dynamic issues. To test for serially correlated errors in the presence of country

specific effects, we refer to a Lagrange multiplier proposed by Baltagi (2005)[12]. If the test indicates serially correlated errors, we model the dynamic process via a lagged dependent variable. Intuitively, the use of a lagged Nominal Rate of Assistance can be explained by a slow speed of adjustment of agricultural policies to changing socio-economic framework conditions. Since we suggest that joining the European Union increases agricultural protection, European Union members might show a less persistent agricultural protection rate due to institutional changes. We pick up this dynamic structure by allowing the coefficient of the lagged dependent variable to differ between EU and non-EU member states. Therefore, we estimate an interaction term of the lagged NRA and the dummy variable indicating the accession to the European Union.

5 Results

Table 1 reports the results applying the estimation strategy outlined above to our data set. Model 1 estimates the impact of supranational decision-making on agricultural protection within the fixed effect framework. As it is well-known in the literature that neglecting the dynamics endemic to time-series cross-section data leads to unreliable results, we pick up the modeling of dynamics in model 2[13]. Model 3 relies on ordinary least squares with a subset of country dummies. We employ country dummies for countries that are less well predicted by the pooled model as stated by table 3 in the appendix. Additionally we test the impact of amending the decision rule in the council by the Single European Act in 1986 in model 4.

Overall, we notice that the estimation results for the standard socio-economic controls are consistent with the results of previous studies, in that most of the "classical" economic and demographic determinants of agricultural protection enter the models with the expected signs if they are statistically significant at a 5 percent level or higher. Additionally, we find that our main results remain statistically significant if we control for different specifications of country heterogeneity and dynamic issues.

In detail, we find that agricultural protection rates are negatively influenced by the share of agricultural employment in total employment (*emplln*), the WTO negotiations (*urround*) and the share of agricultural exports in merchandise exports (*tax_ agri*) across all model specifications. Thus, our analysis confirms Olson's theory that lower cost of collective action due to a decreasing free-riding problem for smaller farm groups implies c.p. higher agricultural protection. Additionally, we capture the negative effects of agreed WTO restrictions on agricultural protection levels with our models. We associate with the negative coefficient of *tax_ agri* that the tax collection constraints faced by governments in developing countries to provide f.e. public goods cause agricultural taxation and

[12] Note that Baltagi (2005) states that it is inappropriate to test for serial correlation assuming no country effects as they might contribute to rejecting the null of no serial correlation. Thus, applying fixed effects might also be seen as method to account for serial correlation due to omitted time-invariant variable bias.

[13] The Lagrange multiplier test indicates that we have serially correlated error terms even if the fixed effects in model 1 might solve a substantial share of serial correlation due to time-invariant omitted variables (see for a discussion on serial correlation in the panel data case Baltagi, 2005, p. 95).

Table 1: Results

	(1)	(2)	(3)	(4)
cons	.172***	.084*	.034*	.028*
	(.063)	(.048)	(.018)	(.017)
LNRA		.665***	.721***	.717***
		(.022)	(.055)	(.055)
LNRA * EU member		-.093**	-.074	-.099
		(.047)	(.070)	(.069)
initial_gdppc			.002	.001
			(.002)	(.002)
gdppcgrowth	.005**	.001	.0005	.0006
	(.002)	(.001)	(.002)	(.001)
compad	-.085	-.017	.017	-.0009
	(.055)	(.042)	(.023)	(.022)
factorend	-.002	-.0006	-.0009***	-.0009***
	(.002)	(.001)	(.0002)	(.0002)
budget	-.141***	-.086**	-.006	.005
	(.050)	(.037)	(.020)	(.018)
tax_agri	-.004***	-.002***	-.001***	-.001***
	(.0007)	(.0005)	(.0003)	(.0003)
emplln	-.228***	-.074***	-.024*	-.036***
	(.034)	(.026)	(.014)	(.013)
urround	-.171***	-.080***	-.050**	-.038*
	(.019)	(.015)	(.021)	(.021)
EU member	.089***	.075**	.099**	.078*
	(.032)	(.035)	(.041)	(.042)
LC				.104***
				(.038)
Country dummies	yes	yes	partial	partial
Dynamic specification	-	LDV	LDV	LDV
Time-invariant variables	no	no	yes	yes
# obs.	1377	1365	1365	1365
# countries	60	60	60	60
R-squared	.332	.910	.935	.937
Baltagi-test	27.010***	-	-	-

Notes: For model 3 and 4 panel corrected standard errors are given in parentheses. * indicates significance at the 10 percent level, ** indicates significance at the 5 percent level, and *** indicates significance at the 1 percent level.

hence decreasing nominal rates of assistance with increasing share of agricultural exports in merchandise exports.

For interpreting the coefficient of *factorend* that turns to be significant for models 3 and 4, we refer to the relative income hypothesis of Tyers and Anderson (1992) and de Gorter and Tsur (1991). Governments tend to compensate the farm sector with low pre-policy endowment incomes as shown by the negative sign across all model specifications.

Corresponding to the so-called development paradox Tyers and Anderson (1992), higher developed countries with high GDP per capita are able to protect their small agricultural sectors. Within our analysis we find a positive but not significant impact of the initial GDP per capita on the agricultural protection level. Note, that the effect of this time-invariant variable is captured by the country specific effects in model 1 and 2. Thus, within these models the effect of economic development on protection is solely approached by the GDP per capita growth that has a positive impact on agricultural protection. For models that pick up dynamic issues the significance of this variable vanishes.

Further, the coefficient of the variable *budget* is at most in accordance with the theory by Beghin and Kherallah (1994). Protection rates decrease with increasing budget costs per capita for the models 1, 2 and 3, but the coefficient alters the sign in model 4.

Moreover, the higher the comparative advantages in agriculture the lower is the demand for agricultural protection given the negative sign for the variable *compad* in model 1, 2 and 4 which is in line with the theory and empirical finding of Beghin and Kherallah (1994). However, the coefficient of *compad* alters the sign in model 3 and remains statistically insignificant for all specifications.

Concerning the impact of supranational decision-making on agricultural protection our estimations predict that joining the EU would increase significantly c.p. agricultural protection levels about 9% in model 1. When we add the lagged dependent variable and the dynamic interaction term in model 2, the impact of joining the EU slightly decreases compared to the non-dynamic estimate, but the coefficient shows still the expected sign and is statistically significant at the 5% level.

Modeling the country heterogeneity with a few country dummies as suggested by cross-validation leads to higher coefficients for the rarely time varying dummy *EU member*. This increase implies that our findings are primarily driven by cross-country differences and not solely by within country variation. Especially the effect of supranational decision-making for the EU-5 might be underestimated in the fixed effect model, since this model just exploits the within country variation. Note, that the EU-6 still exists when the estimation sample starts in 1961.

In column 4 we add a dummy variable LC into our specification to address the amendment of the decision rule in the council by the SEA. With establishing the SEA in 1987 the council can take decisions by qualified majority instead of unanimity rule. The dummy codes country-years before 1988 with 1 if the country is member of the EU and zero for all countries after 1988. The positive sign signals that the council favors higher protection of the agricultural sector under unanimity rule when compared to qualified

majority voting[14].

Within the dynamic specifications we see negative signs of *LNRA*EU member* revealing that agricultural protection patterns in EU countries are less persistent when compared to other countries. But this dynamic pattern is just significant for the fixed effect model.

6 Conclusion

In this paper we propose a theoretical model of agricultural policy decision-making that allows the comparison of policy outcome under the EU-system with the counterfactual policy outcomes that would be observed under a parliamentary and a presidential regime, respectively.

Further, we demonstrate that agricultural policy outcomes vary systematically across formal and informal legislative bargaining procedures and for each bargaining procedure with the number of EU-member states. Accordingly, legislators' incentives to adopt different cooperative legislative bargaining procedures vary systematically with the number of EU-member states. In particular, in the EU-6 national member states have a strong incentive to formulate CAP under the so-called Luxembourg compromise, i.e. to form a stable ex ante coalition in the council excluding the European commission granting each other agenda setting power over nationally important agricultural commodities. The Luxembourg compromise leads to extremely high agricultural protection levels. Interestingly, these incentives vanish with an increasing number of member states. Accordingly, in the EU-15 and especially in the EU-27 national council members observe strong incentives to grant agenda setting power to the Commission as foreseen in the consultation procedure determined in the EU-constitution, which results in a significantly lower agricultural protection when compared to the Luxembourg compromise. However, even under the consultation procedure legislative bargaining in the EU-system implies significantly higher protection levels when compared to counterfactual agricultural protection levels derived under a parliamentary or presidential regimes, respectively. Thus, our theory not only predicts higher protection levels under the EU-system, but furthermore the specific dynamic development of this effect as can be seen in figure 2. Driven by enlargement agricultural protection under the Luxembourg Compromise continuously increased starting from the late 60tees until the early 80tees when unsatisfactory high protection resulting under the Luxembourg compromise finally triggered a switch of the governmental regime to actual application of qualified majority voting in the council under the consultation procedure in 1986 (Hix, 1999, see also). This regime switch induces significant agricultural policy reforms resulting in a sharp decline of protection levels.

In the empirical estimation we apply a dynamic panel estimation using cross country times series data for 60 countries over the period 1961-2005 to test our theory.

[14]This finding is even robust to modeling country heterogeneity with fixed effects. We refrain from reporting these results since model 2 has a lower R^2 compared to the partial non-pooled model. Results are available on request.

Interestingly, empirical estimation results nicely support our theory, i.e. controlling for standard economic and demographic factors as well as for unobserved heterogeneity across countries, a highly significant positive impact for the EU-system results. This effect remains remarkably stable even when various robustness checks are undertaken. Moreover, we identify a highly significant negative interaction affect of the EU-regime dummy for the period after 1988 indicating a regime switch. Again, this empirically identified regime switch nicely corresponds to our theory, i.e. to the predicted impact of switching from the Luxembourg Compromise to EU-universalism, which exactly occurred in the end of 80tees.

References

Anderson, Kym and Ernesto Valenzuela, "Estimates of Global Distortions to Agricultural Incentives, 1955 to 2007," World Bank, Washington DC, `http://go.worldbank.org/YA039F35E0` October 2008.

_ , ed., *Distortions to Agricultural Incentives: Global Perspective*, World Bank, 2008.

Balisacan, A. M. and J. A. Roumasset, "Public Choice of Economic Policy - The Growth of Agricultural Protection," *Weltwirtschaftliches Archiv*, 1987, *123*, 232–248.

Baltagi, Badi H., *Econometric Analysis of Panel Data*, New York: Wiley, 2005.

Beck, Thorsten, George Clarke, Alberto Groff, Philip Keefer, and Patrick Walsh, "New tools in comparative political economy: The Database of Political Institutions," *World Bank Economic Review*, 2001, *15* (1), 165–176.

Beghin, J.C. and M. Kherallah, "Political institutions and international patterns of agricultural protection," *The Review of Economics and Statistics*, 1994, *76* (3), 482–489.

Bilal, Sanoussi, "The Political Economy of Agricultural Policies and Negotiations," in Sanoussi Bilal and Pavlos Pezaros, eds., *Negotiating the Future of Agricultural Policies: Agricultural Trade and the Millennium WTO Round*, The Hague: Kluwer Law International, 2000, pp. 81–93.

Black, Duncan, *The Theory of Committees and Elections*, London and New York: Cambridge University Press, 1958.

de Gorter, H. and J. Swinnen, "Politcal Economy of Agricultural Policy," in G.C. Rausser and B.L. Gardner, eds., *Handbook of Agricultural Economics*, Vol. 2B, North-Holland, 2002, chapter 36, pp. 1893–1943.

_ , J. Pokrivcak, and J. Swinnen, "The 'restaurant table' effect: Europe and the Common Agricultural Policy," in "World Agricultural Trade," Boulder: West Press, 1998.

de Gorter, Harry and Yacov Tsur, "Explaining Price Policy Bias in Agriculture: The Calculus of Support-Maximizing Politicans," *American Journal of Agricultural Economics*, 1991, *73* (4), 1244–1254.

Diermeier, D. and T. Feddersen, "Cohesion in Legislatures and the Vote of Confidence Procedure," *American Political Science Review*, 1998, *92*, 611–621.

FAOSTAT, "Various timeseries," `http://faostat.fao.org/default.aspx` 2008.

Henning, Christian, Eva Krampe, and Christian Aßmann, "Electoral Rules and Agricultural Protection: A missing link?," 2010. Unpublished manuscirpt.

Henning, Christian H. C. A. and C. Struve, "Electoral Systems, Postelection Bargaining and Special Interest Politics in Parliamentary Systems," in M. Hinich and W.A. Barnett, eds., *Topics in Analytical Political Economy*, Vol. 17 of *International Symposia in Economic Theory and Econometrics*, Amsterdam: Elsevier, 2007, chapter 3, pp. 43–82.

_ , Arne Henningsen, Carsten Struve, and Jörg Müller-Scheeßel, *Auswirkungen der Mid-Term-Review-Beschlüsse auf den Agrarsektor und das Agribusiness in Schleswig-Holstein und Mecklenburg-Vorpommern* Agrarwirtschaft, Sonderheft 178, Bergen/Dumme: Agrimedia, 2004.

_ , Simon von Janowsky, Christof Kluß, and Volker Saggau, "Information and Innovation Diffusion in Business Networks: an Agent Based Modeling Approach," Advanced-Eval Working Paper Series WP5-2, University of Kiel 2007.

Hix, Simon, *The Political System of the European Union* The European Union Series, Hampshire, New York: Palgrave, 1999.

Honma, M. and Y. Hayami, "Structure of Agricultural Protection in Industrial Countries," *Journal of International Economics*, 1986, *20*, 115–129.

Huber, J., "The Vote of Confidence in Parliamentary Democracies," *American Political Science Review*, 1996, *90*, 269–282.

Krehbiel, Keith, *Information and Legislative Organization*, Ann Arbor: University of Michigan Press, 1991.

Marshall, Monty G., Keith Jaggers, and Ted Robert Gurr, "Polity IV Project: Political Regime Characteristics and Transitions 1800-2007," `http://www.systemicpeace.org/polity/polity4.htm` 2008.

Napel, Stfean, "The Inter-Institutional Distribution of Power in EU Codecision," *Social Choice and Welfare*, 2006, *26* (1), 1–26.

OECD, *Agricultural Policies in Emerging and Transition Economies: Special focus on non-tariff measures*, Paris: OECD, 2001.

Olper, A. and V. Raimondi, "Constitutional Rules and Agricultural Policy Outcomes," University of Milano, Department of Agricultural Economics September 2008.

Olper, Alessandro, "Determinants of Agricultural Protection: The Role of Democracy and Institutional Setting," *Journal of Agricultural Economics*, 2001, *52* (2), 75–91.

Olson, Mancur, *The Logic of Collective Action*, Cambridge (Mass.): Harvard University Press, 1965.

Park, Jong Hee and Nathan Jensen, "Electoral Competition and Agricultural Support in OECD Countries," *American Journal of Political Science*, 2007, *51* (2), 314–329.

Peltzman, S., "Toward a More General Theory of Regulation," *Journal of Law and Economic*, 1976, *199*, 211–240.

Persson, Torsten and Guido Tabellini, *Political Economics. Explaining Economic Policy*, The MIT Press, 2002.

Shepsle, Kenneth A., "Institutional Arrangements and Equilibrium in Multidimensional Voting Models," *American Journal of Political Science*, 1979, *23* (1), 27–59.

Swinnen, J.F., "A Positive Theory of Agricultural Protection," *American Journal of Agricultural Economics*, 1994, *76*, 1–14.

Swinnen, J.F.M., L. Dries, and K. Macours, "Transition and agricultural labor," Policy Research Group working paper 16, Department of Agricultural and Environmental Economics, Katholieke Univeriteit, Leuven 2000.

Thies, Cameron G. and Schuyler Porche, "The Political Economy of Agricultural Protection," *The Journal of Politics*, February 2007, *69* (1), 116–127.

Tsebelis, G., "The European Parliament under the Cooperation Procedure: The Power of the Conditional Agenda Setter," *American Political Science Review*, 1994, *88*, 128–142.

Tyers, R. and K. Anderson, *Disarray in World Food Markets*, Cambridge, New York, Melbourne: Cambridge University Press, 1992.

Weingast, Barry, "A Rational Choice Perspective on Congressional Norms," *American Journal of Political Science*, 1979, *23*, 245–263.

Weingast, Barry R. and William J. Marshall, "The Industrial Organization of Congress; or why Legislatures, like Firms, are not Organized as Markets," *Journal of Political Economy*, 1988, *96*, 132–163.

_ , Kenneth A. Shepsle, and Christopher Johnsen, "The Political Economy of Benefits and Costs: A Neoclassical Approach to Distributive Politics," *Journal of Political Economy*, 1981, *89*, 642–664.

World Bank, "World Development Indicators," Washington D.C.: The World Bank 2008.

Table 2: Sample characteristics

country	periods	nraEU	initial_gdp	gdppcgrowth	compad	factorend	budget	tax_agri	emplln
Argentina	23	-0.120	8.975	1.121	0.685	18.930	0.235	53.164	-2.216
Australia	35	0.054	18.675	1.765	0.861	100.623	0.507	34.122	-2.866
Austria	35	0.413	16.039	2.323	0.482	5.454	-0.123	4.615	-2.540
Bangladesh	14	-0.014	0.703	2.821	0.437	0.222	-0.009	3.603	-0.545
Brazil	21	-0.046	7.195	1.085	0.370	3.880	0.061	28.506	-1.610
Bulgaria	14	-0.070	6.601	2.163	1.875	11.630	0.037	15.518	-2.551
Canada	43	0.261	13.025	2.276	0.747	75.947	0.078	10.746	-2.959
Chile	17	0.069	6.501	4.348	0.420	2.103	0.098	15.427	-1.796
Colombia	41	0.029	2.757	1.882	0.596	0.920	0.046	54.353	-1.154
Czech Rep.	13	0.289	14.308	2.738	0.478	6.474	-0.074	5.050	-2.470
Denmark	40	0.620	15.372	2.042	0.655	15.327	0.640	27.595	-2.765
Dominican Rep.	28	-0.101	2.893	2.180	0.625	1.459	0.019	59.792	-1.487
Ecuador	25	0.008	5.704	0.349	0.425	1.352	0.071	30.213	-1.143
Estonia	14	0.138	7.653	4.302	0.552	8.894	-0.193	10.979	-2.148
Ethiopia	13	-0.149	0.451	3.345	0.614	0.432	0.002	71.719	-0.189
Finland	45	0.856	9.031	2.931	0.673	9.623	-0.091	4.406	-2.194
France	35	0.615	15.920	2.017	0.694	13.480	0.115	14.836	-2.828
Germany	16	0.615	24.864	1.555	0.448	10.614	-0.182	4.782	-3.569
Ghana	8	-0.016	0.960	2.154	0.633	0.701	0.015	37.938	-0.565
Hungary	14	0.269	10.594	3.243	0.503	8.693	0.143	13.330	-2.182
Iceland	27	2.480	21.232	2.108	1.056	0.515	-0.490	2.102	-2.347
India	40	0.050	0.727	2.567	0.486	0.757	0.001	23.766	-0.409
Indonesia	6	0.108	2.631	2.568	0.340	0.428	0.008	10.298	-0.748
Ireland	35	0.916	9.406	4.173	0.584	5.520	0.660	25.657	-1.903

Italy	36	0.483	13.537	2.166	0.475	4.308	-0.135	7.364	-2.381
Japan	41	0.935	8.237	3.396	0.380	0.990	-0.169	0.685	-2.405
Kenya	3	0.084	1.301	0.213	0.387	0.419	0.021	48.186	-0.300
Korea, Rep.	17	1.493	9.849	5.044	0.474	0.671	-0.149	1.260	-2.125
Latvia	13	0.277	5.948	6.133	0.468	6.866	-0.155	9.708	-2.097
Lithuania	14	0.190	9.306	1.767	0.702	9.997	-0.002	14.166	-2.038
Madagascar	14	-0.015	0.869	-0.303	0.385	0.525	0.003	43.660	-0.290
Malaysia	44	-0.040	2.191	3.961	0.560	0.662	0.112	28.431	-1.052
Mexico	12	0.145	9.810	1.526	0.219	2.900	-0.025	9.907	-1.531
Mozambique	12	0.089	0.404	4.717	0.359	0.545	-0.012	18.060	-0.206
Netherlands	35	0.768	18.472	1.903	0.819	2.945	0.598	20.362	-3.082
New Zealand	32	0.120	16.438	1.235	0.833	14.799	1.002	60.002	-2.259
Nicaragua	11	-0.080	1.999	2.379	1.018	4.566	0.019	59.098	-1.570
Nigeria	5	-0.054	1.307	2.707	0.829	2.042	-0.010	1.920	-1.155
Norway	27	2.701	25.098	2.556	0.492	7.077	-0.289	1.291	-2.840
Pakistan	11	-0.057	1.610	1.847	0.516	0.965	-0.005	17.201	-0.681
Philippines	18	0.230	2.235	1.539	0.455	0.446	-0.007	9.909	-0.862
Poland	14	0.197	7.607	4.383	0.258	3.071	-0.007	9.854	-1.493
Portugal	30	0.363	9.864	2.538	0.526	2.443	-0.185	7.799	-1.730
Romania	14	0.405	6.357	2.381	1.009	5.539	-0.032	5.315	-1.820
Russia	12	0.186	8.180	2.227	0.587	15.090	-0.063	1.494	-2.243
Senegal	5	-0.075	1.398	1.507	0.237	0.874	-0.041	16.318	-0.312
Slovak Rep.	12	0.356	10.094	4.355	0.493	5.524	-0.082	4.322	-2.388
Slovenia	14	0.713	13.681	3.254	1.582	8.391	-0.221	4.109	-3.765
South Africa	45	0.078	5.492	1.017	0.332	6.452	0.022	15.626	-1.744
Spain	28	0.365	15.203	2.123	0.487	8.357	0.024	14.992	-2.207
Sri Lanka	44	-0.102	0.929	2.970	0.519	0.285	0.014	58.249	-0.678
Sweden	35	0.759	17.534	1.759	0.694	14.023	-0.206	2.563	-3.056
Switzerland	16	2.689	33.295	0.529	0.411	2.455	-0.405	2.917	-3.104
Tanzania	3	-0.101	0.837	3.831	0.572	0.610	0.002	33.260	-0.235

Thailand	25	-0.025	2.255	4.750	0.209	0.852	0.079	27.061	-0.476
Turkey	37	0.044	3.578	2.210	0.391	1.922	0.024	39.133	-0.590
Ukraine	13	-0.050	5.688	-0.744	0.987	8.849	0.021	14.924	-1.905
United Kingdom	35	0.695	15.351	2.123	0.830	10.621	-0.166	7.010	-3.810
United States	35	0.171	20.907	2.082	0.777	52.412	0.059	14.166	-3.557
Zambia	13	-0.249	1.140	-0.284	0.314	1.733	-0.002	9.393	-0.353
Total	1377	0.408	9.986	2.384	0.600	11.263	0.052	20.893	-1.973

Table 3: Mean squared forecast error by country

Country	**MSFE**	**Std. dev.**	**Min**	**Max**
Argentina	0.004	0.010	0.000	0.043
Australia	0.001	0.002	0.000	0.009
Austria	0.016	0.021	0.000	0.095
Bangladesh	0.004	0.004	0.000	0.014
Brazil	0.012	0.029	0.000	0.115
Bulgaria	0.025	0.023	0.000	0.077
Canada	0.008	0.014	0.000	0.065
Chile	0.002	0.002	0.000	0.009
Colombia	0.004	0.006	0.000	0.026
Czech Rep.	0.015	0.021	0.000	0.069
Denmark	0.025	0.037	0.000	0.194
Dominican Rep.	0.025	0.028	0.000	0.085
Ecuador	0.008	0.009	0.000	0.029
Estonia	0.015	0.024	0.000	0.073
Ethiopia	0.002	0.002	0.000	0.007
Finland	0.045	0.099	0.000	0.535
France	0.022	0.036	0.000	0.156
Germany	0.016	0.017	0.000	0.054
Ghana	0.001	0.002	0.000	0.004
Hungary	0.013	0.016	0.000	0.050
Iceland	0.355	0.410	0.000	1.384
India	0.016	0.024	0.000	0.103
Indonesia	0.011	0.023	0.000	0.057
Ireland	0.076	0.114	0.000	0.574
Italy	0.012	0.023	0.000	0.123
Japan	0.032	0.072	0.000	0.437
Kenya	0.002	0.000	0.002	0.003
Korea, Rep.	0.046	0.060	0.000	0.250
Latvia	0.036	0.051	0.000	0.152
Lithuania	0.021	0.022	0.000	0.061
Madagascar	0.002	0.003	0.000	0.010
Malaysia	0.002	0.003	0.000	0.018
Mexico	0.023	0.061	0.000	0.215
Mozambique	0.012	0.035	0.000	0.122
Netherlands	0.026	0.038	0.000	0.186
New Zealand	0.005	0.005	0.000	0.018
Nicaragua	0.005	0.006	0.000	0.022
Nigeria	0.003	0.004	0.000	0.009

Norway	0.202	0.340	0.000	1.577
Pakistan	0.006	0.007	0.000	0.022
Philippines	0.009	0.011	0.000	0.037
Poland	0.028	0.067	0.000	0.249
Portugal	0.012	0.025	0.000	0.124
Romania	0.044	0.071	0.000	0.260
Russia	0.019	0.023	0.000	0.074
Senegal	0.003	0.004	0.000	0.009
Slovak Rep.	0.020	0.019	0.000	0.054
Slovenia	0.030	0.044	0.000	0.140
South Africa	0.008	0.012	0.000	0.043
Spain	0.015	0.033	0.000	0.164
Sri Lanka	0.010	0.016	0.000	0.059
Sweden	0.028	0.035	0.000	0.152
Switzerland	0.327	0.473	0.004	1.498
Tanzania	0.006	0.007	0.000	0.014
Thailand	0.004	0.005	0.000	0.016
Turkey	0.019	0.023	0.000	0.084
Ukraine	0.045	0.060	0.000	0.181
United Kingdom	0.021	0.031	0.000	0.165
United States	0.007	0.008	0.000	0.042
Zambia	0.034	0.048	0.001	0.164