

Country-of-Origin Labelling for the Italian early potato supply chain

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Jel classification: Q13, Q17, L22

1. Introduction

The early potato sector has played a historically important role among southern Italian farm produce. In past decades, this product accessed interesting market outlets both at national and European level, with Germany still now representing the main foreign market (Lombardi *et al.*, 2012). However, in recent years progress in the sector has ground to a halt. In the last decade, Italy has shifted from being a net exporter to net importer (Lombardi *et al.*, 2012). In two out of the three Italian regions in which early potato farming is concentrated, Puglia and Campania, the sector is clearly in difficulty. In the third region, Sicily, the production base seems to hold, although the past few years have seen a decline in farm profitability and an increase in competition with other more profitable crops such as carrot. The countries that have most benefited from the decline in Italy's early potato competitiveness are firstly those on the southern shores of the Mediterranean, but also EU countries such as France (Lombardi *et al.*, 2012).

There are various measures that may be taken to relaunch this sector. One of these is product traceability, which allows the consumer to identify the product origin with certainty. Much has been written on the role to be played by a country-of-origin labelling (COOL) policy in increasing the

Abstract

By means of cost-benefit analysis, we assess whether it is worth introducing a traceability protocol in Italy, which allows to ascertain the area of origin of early potatoes. Until recently, early potato was a major export product in southern Italy. However, in the last ten years the sector has clearly stagnated. Our study seems to show that a country-of-origin labelling (COOL) policy – if appropriately implemented – could make this product competitive once again.

Key Words: early potato, cost-benefit analysis, traceability, COOL - country of origin labelling.

Résumé

Dans ce travail, nous allons évaluer, à l'aide d'une analyse coûts-avantages, l'utilité de l'introduction en Italie d'un protocole de traçabilité permettant de parcourir l'origine des pommes de terre primeur. Il y a peu de temps encore, dans le sud de l'Italie, la pomme de terre primeur représentait un produit important pour les exportations. Malheureusement, ces dix dernières années, ce secteur a connu une régression évidente. Les résultats de notre étude semblent confirmer que l'étiquetage indiquant le pays d'origine (EPO) – si appliqué correctement – pourrait redonner de la compétitivité à ce produit.

Mots-clés: Pomme de terre primeur, analyse coûts-avantages, traçabilité, Etiquetage indiquant le pays d'origine (EPO).

competitiveness of Italian products to which consumers in Italy and also elsewhere in Europe generally attach a very positive image (Cembalo *et al.*, 2008; Ciccia and Colantuoni, 2010; Caracciolo and Cembalo, 2010; Ciccia *et al.*, 2011; D'Amico *et al.*, 2011; Ciccia *et al.*, 2012a; Zanoli *et al.*, 2012; Migliore *et al.*, 2012; Ciccia *et al.*, 2013).

The early potato sector is characterised by three fundamental elements: concentration of production in only three Italian regions (Sicily, Campania and Puglia), importance

of exports for the sector economy, and the good reputation of the Italian product stemming from the special organoleptic characteristics of the local early potato. In this scenario, being able to differentiate early potatoes from Italy, through certification of origin, could become a necessary strategic choice to enhance product competitiveness on overseas markets and at home.

The process described becomes increasingly desirable if we observe the trends of commercial flows. In particular, we should underline the progressive importance of sales volumes chiefly from France, Israel and Egypt, and the concurrent decline in exports to the historic market of Germany.

In a market, such as that of early potato which is undergoing profound changes, supplying a product whose origin is certain might allow not only a better performance on foreign markets but also prevent opportunist behaviour by which non-Italian products could be sold as Italian solely thanks to creating packaging or simple external preparation in Italy. Obtaining a traced product whose national origin could be assured represents a differentiation strategy in line with the extensive regulations on the subject of food safety which in our modern competitive scenarios regulates rela-

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tions between suppliers and the Mass Retailers Channel (MRC).

The strategy pursued by the commercial phase of the production chain has been to multiply and differentiate a large number of private standards which, well before mandatory public regulations were introduced, aimed to select suppliers with a view to reaching higher levels of food safety and traceability, shifting a substantial part of the costs and risks onto the phases upstream of the production and onto end consumers (Fulponi, 2006; Del Giudice, 2009).

MRC is currently the key player in the production chains, the intermediary with which all the sectors of Italian agribusiness will have to deal in Italy and abroad. Not even the early potato can avoid this challenge. The success of the process described lies on the one hand in the restructuring of the production such as to become an interlocutor with MRC, and on the other in the growing supply of innovation and recognizable quality in terms of service and product.

As regards the growing demand for traceability by the modern consumer, it appears evident that certification, assurance and COOL of the early potato become attributes that are able to give the product the necessary innovative quality to increase competitiveness on modern food markets. The correlation between innovativeness, food safety and COOL represents an important aspect, destined to take on growing strategic value (Banterle and Stranieri, 2008).

Among the motivations that underlie this statement, there is renewed attention both to food product origin and to related policies on the part of countries which used not to be sensitive to this issue, such as the US or the newly emerging countries (Giovannucci *et al.*, 2009). This process means that, in the future, differentiation of food products and relative competition on European and global markets will be ever more tied to country-of-origin labelling (COOL) policies that are characterised as a mixture between private standards and public regulation. Moreover, the growing demand from consumers not only for food safety in the strict sense but also for general product reassurance, in relation to the impacts which this may have on the environment, health and society, will increasingly broaden the scope of the simple certification of origin (Caracciolo *et al.*, 2011; Lombardi and Caracciolo, 2012). Not only will it be a product obtained in a certain area, with certain production protocols, certain organoleptic and nutritional characteristics but also a food product whose production chain may give assurance as to growing attention to reducing environmental impact (Cicia *et al.*, 2011, Panico *et al.*, 2011, Cembalo *et al.*, 2012), and respect for the working conditions of those involved, in line with workers' rights and human rights as a whole.

In this study we assess the possible impact of a COOL policy on the early potato sector.

The empirical strategy was to implement a cost-benefit analysis framework in which most of the main aspects were taken into account. We first addressed the question of profitability at the production side focusing on those regions where early potato production is concentrated. Then we moved along the supply chain highlighting the weaknesses, strengths and relationships between different nodes of the chain. The theoretical approach used is that of the "*product filiere*" of Malassis (1983). The sectoral analysis was complemented by a study of international trade flows of early potato that highlighted the progressive reorganization that has been taking place over the last decade in the market relationships between countries, importers and manufacturers. Last but not least aspect was the consumer side. We addressed two questions: 1. since the COOL protocol introduces new costs at the production and distribution sides, are consumers willing to pay a premium price for traced early potato? If so, how much would it be? 2. Given the current Italian market of fresh vegetables, what is the effect of a price increase on the demand for this product? To put it differently, we calculated own and cross price elasticities by means of a demand system estimation. The combination of these different analyses allowed us to have a quite clear picture of the impact of this tool to relaunch the Italian early potato sector.

2. The early potato supply chain in Italy

As shown by the summary in table 1, the overall early potato production in Italy amounts to 3.5 million quintals obtained from an area slightly exceeding 18,000 ha with an average yield of 195 quintals/ha, although in Campania this figure sometimes exceeds 250 quintals/ha. Compared with the situation in the year 2000, there has been a 25% reduction in the area under cultivation, and an almost 30% decrease in production.

It clearly emerges from the table contents that this crop is grown almost exclusively in southern Italian regions (95%), as illustrated by the distribution map in figure 1. Half of the acreage and total harvest are concentrated in Sicily,

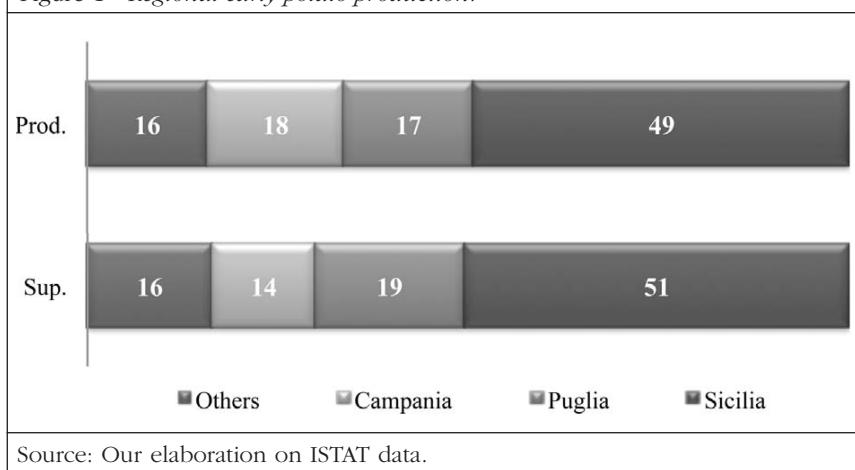
Table 1 - Early potato: area under cultivation (ha) and harvest (q) per region (2010).

Regions	Early potato		Regions	Early potato	
	Ha	Kg (100)		Ha	Kg (100)
Liguria	352	36,400	Abruzzo	50	11,400
Veneto	75	22,565	Campania	2,458	630,064
Friuli VG	219	89,389	Puglia	3,523	595,579
North	650	149,274	Calabria	360	49,686
Toscana	188	38,470	Sicilia	9,170	1,735,710
Marche	4	980	Sardegna	1,599	277,852
Lazio	108	26,445	South	17,160	3,300,291
Center	300	65,895	Italy	18,110	3,515,460

Source: Our elaboration on ISTAT data.

followed at some distance by Puglia and Campania which represent the two other regions with significant acreage and production.

Figure 1 - Regional early potato production.



In recent years in Sicily, there has been a process of supply concentration, which is particularly marked in the areas of higher specialisation, especially integrated with the downstream phases of this process (Timpanaro, 2003; Adami *et al*, 2005). We are in the presence of firms which, to limit market fluctuations, both in terms of supply and prices, have strategically developed vertical integration processes (through the acquisition of farms or the renting of land). In previous years, it was not unusual to find very different co-holding relations among members of a production chain. However, this phenomenon now rarely occurs.

After the necessary handling and packing, the fresh product reaches consumers through direct farm sales (2%), specialized retail outlets (48%) and big distribution chains (55%). However, during this commercial step, not infrequently there is a loss of product identity,

i.e. "Sicilian origin", due to their handling. This happens especially to the goods in the first stage (in big bags, etc.), which are then mixed with potatoes from non-EU countries. Instead, when potatoes are sold in the second processing step (1 to 10 kg string bags, but also in boxes or jute bags up to 25 kg), the product conserves the label of the producer and/or retailer, maintaining its own identity.

A very important aspect, emerging during our survey, is the downsizing of exports compared with the previous decades, currently around 40% of the regional total. Of the destination countries of Sicilian early potato crop, Germany still occupies the top position with 15%. However, there has been a loss in demand from German firms which are particularly loyal to the Sicilian early potato. This phenomenon, especially marked in the last 4-5 years, is to be linked to the role played by early crops in non-EU countries (Egypt, Tunisia, Morocco and Israel). Other importers are, in decreasing order, the Netherlands and France

(6%), the UK (4%) and Austria and Denmark (3%). "Other countries" intercept 5% of overall exports of Sicilian early potato. Of these, growing interest is invested in Poland, whose market seems very interested in early potato, as in other regional farm products (citrus, out-of-season vegetables, etc.).

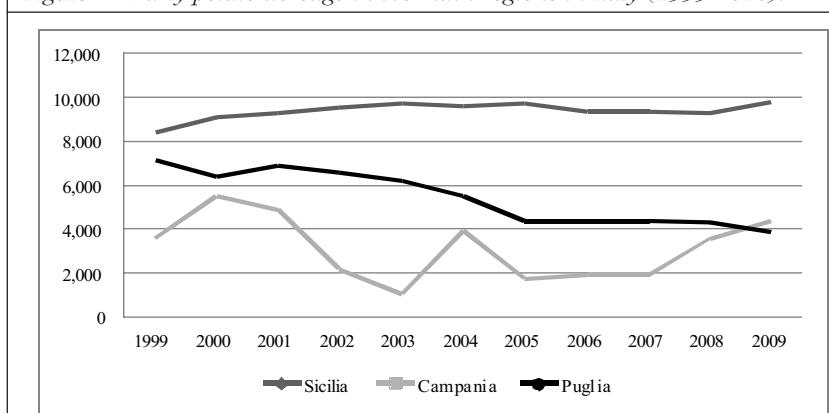
Transport for Europe (including Germany) is effected almost exclusively by road freight using refrigerated or covered trailers. Maritime transport is used only for eastern markets, namely Russia and Ukraine, which purchase Sicilian early potatoes in more or less alternate phases.

The recent decline in market shares for exported early potatoes, especially in the shares of historic markets (Germany, France, etc.) in favour of early producers from the sou-

Source: Our elaboration on ISTAT data.

The only region whose acreage has substantially increased in recent years is Sicily (Figure 2). By contrast, the situation in Campania is substantially stationary while a major decline has occurred in Puglia.

Figure 2 - Early potato acreage in the main regions in Italy (1999-2010).



Source: Our elaboration on ISTAT data.

In the following sections, for these three top early potato-producing regions, we not only provide more details on the production context but, albeit summarily, attempt to profile the production chain in the three regional contexts.

2.1. Sicilian production chain

In Sicily (ISTAT, 2011) over 9,000 hectares of potatoes are grown (Table 2), of which no less than 85% is geared to the production of early potatoes, also known as early potatoes (autumn-spring-summer seasonal cycle), with the harvest of tubers in the months of March-June. Sicilian potato production accounts for almost €95 million of total regional farm production. Regional production is around 200,000 tonnes by virtue of average regional yields of 207 quintals/ha.

Table 2 - Trends in early potato acreage and production in Sicily, Puglia and Campania (2000-2010).

Regions	Area (ha)		Production (t)	
	2000	2010	2000-2003	2007-2010
Sicilia	9.080	9.170	198.577	189.682
	100	101	100	96
Puglia	6.398	3.523	131.052	71.691
	100	55	100	55
Campania	5792	2.458	112601	82559
	100	42	100	73

Source: Our elaboration on ISTAT data.

thern Mediterranean basin (Egypt, Morocco, Tunisia and Israel), generally seems, as with other Mediterranean crops (citrus, vegetables, etc.), a trend that is difficult to reverse unless the peculiarities of Sicilian early potatoes are successfully highlighted, also through a proper product marketing policy able to satisfy the more demanding market segments, including the German market.

2.1.1. Profitability analysis of the early potato in Sicily

Through a questionnaire administered to a sample of 12 farms located in the provinces of Siracusa and Ragusa, we analysed the economic results of the early potato in Sicily so as to contribute to ascertaining the level of competitiveness in the sector¹. The sample businesses were chiefly medium-sized, and run along a capital-based model with salaried workers. The mean value of the fixed assets (land) is about €44,000/ha, that of operative capital and investment equals €4,900/ha.

The economic results of potato farms are chiefly affected by two elements: plot yield and product sale prices. The former is inversely proportional to harvest earliness, and the latter is directly correlated with the same, as a result of the arrival of produce on the home market from other countries (Egypt, etc.), besides other regions in Italy (Puglia and Campania). The data for the 2009-2010 cropping season show declared sales prices ranging from €35 to €40/q, with an average of €37/q. Yields ranged from 220 to 280 q/ha with an average of 257 q/ha.

The production cost structure is dominated by explicit costs (75-81% of the production costs for farms that own the land and 92-93% for those that rent it) and by the items *technical equipment* (39-50%) and *wages* (35-44%). In this regard, it should be noted that seed potatoes are imported at high unit costs and the crop labour requirement is substantial since the harvest is done by hand, insofar as this is a product that could be damaged by harvest machinery.

The composition of Net Income varies greatly according

to whether the farm business owns or rents the land. In the first case, the largest item concerns payment for fixed assets (61-73%), followed by *management* and *administration* (20-26%). In the latter, the dominant component is represented by *management* (61-70%), followed by the item *interest* (30-39%).

Ascertained profitability indexes fall in the range 1.1/2.4. As already highlighted, factor profitability is especially affected by yield and sales prices. Given substantially the same agro-technical technique adopted by the various farms, the ranges in yields are less accentuated than those of prices. Having said that, both tend to be higher in larger farms.

The crop economic performance is positive on average, such that there is a positive difference between Net Income and Reference Net Income. The analyses carried out indicate a mean value for this indicator of about €900 per hectare. Nevertheless, even in the presence of satisfying income levels, early potato-growing in Sicily appears fairly dynamic in terms of the area under cultivation, as has already emerged in the course of other research works (Timpanaro, 2003; Adami *et al.*, 2005; Cembalo *et al.*, 2012), with year-on-year oscillations in farmed areas of around 15-20%. This may be attributed both to technical problems (soil exhaustion, etc.) and more so to market trends (limited production prices and high supply in the previous cropping season, huge imports from abroad, etc.). Moreover, we should not overlook the competition between potato and carrot, which both occupy the same areas, and which is currently tipping in favour of carrot. In recent years, the latter crop has raised considerable interest both on national and European markets, generating better economic results for operators in firms along the production chain than for early potato.

2.2. The production chain in Puglia

In terms of early potato production in Italy, Puglia is one of the most important, contributing about €49 million to the value of agricultural production in the region. The production fabric consists almost entirely of small farms, which are often smaller than one hectare.

Although in the past decade the sector has been affected by considerable downsizing of its production base and production volumes (more than halved), it still plays an important role in Italy's productive scenario. After all, with 3,523 hectares given over to early potato (ISTAT, 2011) and over 71,000 tonnes produced (annual average for 2007-2010), Puglia accounts for 19% of the whole nationwide area under early potato and for 18% of the corresponding production volumes (Table 2).

Potato cultivation in Puglia has for some years felt the effect of a decline in product competitiveness on its main market outlets in northern Europe (Germany and the UK)

¹ For a detailed analysis of the method used to analyse the business results in question, see Appendix I.

and a reduction in early potato consumption on the domestic market. The sector is weakly structured and poorly co-ordinated due to the considerable business fragmentation both in the farm production phase and in marketing. This particularly fragmented production and commercial fabric have to deal with a highly concentrated distribution sector. Over the years, the growth in the market share held by the MRCs (to which about 85% of regional production flows) has weakened farm businesses which, in the negotiation process, see their bargaining power substantially reduced to zero. It is especially in establishing the selling price and quantities that early potato producers suffer most, since they have to accept a payment that is basically set by the purchasers and a demand for volumes which is barely negotiable. The prevailing opinions gathered during the survey view the aggregation of agricultural supply, improvement in the efficiency of transport/logistics systems and product certification measures as the avenues to pursue in order to increase the sector competitiveness. In the past, attempts to concentrate supply through the setting up of cooperatives and associations have proved fairly ineffectual, very often turning out to be failures, albeit producing satisfying results in an isolated case (that of Potato Producers' Association); they were halted in their tracks due to the reduction in the product volumes delivered.

In addition to the farmers' difficulty in creating critical mass is the fragmentation of the commercial sector which, except in rare cases, has no structures able to aggregate supply and rationalise it into volumes that make it possible to establish partnership strategies with the MRCs. In this system, with poorly-coordinated operators along its production chain, forms of rationalisation are also necessary in managing logistics and transport through greater coordination and cooperation among the various players. Today, the transport of potato production uses distribution centres and hubs outside the region which manage supply to the MRCs, and wholesale markets for the remaining share (which especially supply exports to the Polish market and traditional retail). Transport is exclusively by road, while other solutions, such as the combined mode of lorry plus train, are little used due to longer trip times and the shortcomings of the Italian railway system.

In the light of the sector characteristics and given a production that may rely on particularly highly-prized varieties due to shape, colour, flavour and nutritional value (such as the early potato from Zappaneta and Sieglinde from Galatina), it is essential to act on product traceability – through

suitable certification, communication, promotion and packaging – and on innovation which in the recent past was also supported by regional projects to develop the early potato in Puglia through process and product innovations.

2.3. The production chain in Campania

The early potato, traditionally a high-quality farm product in Campania, has progressively lost importance due to concomitant factors emerging fairly clearly from the survey performed in the context of this research of various operators in the regional production chain². The data concerning early potato cultivation in Campania in the period 2000–2010 showed strong annual oscillations of the areas under cultivation, even higher than those already found for Sicily: years in which 4000 ha were exceeded were followed by years in which areas under potato fell to around 2000 (ISTAT, 2011).

The share of the area, in the south and nationwide, used for this crop was around 19% and 16%, in the first and second half, respectively, of the decade in question. On the production side, at the beginning of the decade there were years in which 170,000 tons were exceeded, 30% of which were in the south and nationwide while the average was 25%. In the second half of the period, the regional share of southern Italian production and nationwide was around 21% and 20%, respectively (ISTAT, 2011; Regione Campania, 2011). There emerges an overall picture of decreasing importance (Table 2).

In the past, these areas gave rise to important export flows, especially to Germany and France (on this and other aspects see Gorgitano, 2002). Production substantially follows two large sales channels: the traditional one of wholesale traders and the more modern one, of producers' organisations (POs) to which increasing numbers of farmers belong. A few wholesalers operate in the above areas. They almost always supply farmers with imported seed tubers generally at very high prices and then take back the product from the farms at prices which, at the first signs of market saturation, become laughable. Almost all the product handled by them is used for fresh consumption, of which about 20% is placed on foreign markets. Of the product for the domestic market, 60% is sold to general markets, and about 20% to the MRCs. POs operate chiefly in the above areas and are very few in number. They generally deliver more than 50% of production to processing, while 45% goes in roughly equal parts to the MRCs, wholesalers and exporters.

The salient aspects of the regional production chain are weak integration between the various phases and the absence of efficient structures for storage and product transfer. Still today this transforms good harvests into crises for farmers forced to sell to wholesalers at very low prices or delay product harvest, then placed as a common potato. The crises in the past years were so serious as to induce the Campania Regional Authority to undertake initiatives both to stabilise prices such as the Potato Exchange (*Borsa Pa-*

² Besides a phase of data acquisition at the province level concerning the area given to this crop and the production in the last decade, the survey involved interviews, carried out in spring 2011, with privileged key informants such as public employees at the provincial and regional level, as well as questionnaires administered to those involved in production, distribution and processing.

tata)³ and to promote the product on the market by establishing the brand “*Patata felix*”⁴.

It should be underlined that POs as well as traders are increasingly launching initiatives of quality enhancement through cultivar testing and experimentation in collaboration with public and/or private research institutes. There is an ever-increasing trend towards integrated production and small-sized packages (1.5-2.5 kg) whose labels report information on origin, farming method, cultivar, sorting and advice for use. This is designed to relaunch a product with unbeatable organoleptic characteristics which for some years has increasingly targeted Eastern European countries, which are not yet very demanding. In this regard, operators have reported the persistence of rail network inefficiencies which, in practice, force the choice upon road transport, which is easier to manage and more controllable. The current freight villages of Marcianise and Nola, despite the fact that they are situated in the “heart” of the production areas, show such structural shortcomings as to be incompatible with rapid distribution times as well as transport modes required by a fairly delicate product like early potato.

2.4. International trade in the Italian early potato

Analysis of the Italian early potato production chain has clearly shown a traditional suitability for exports to central European markets, especially Germany. The past decade

Table 4 - Early potato exports by country of destination.

Country	2000/01	2002/03	2004/05	2006/07	2008/09
	€ (1000)				
Germany	42,054	38,453	30,939	39,124	39,735
France	1,130	1,088	1,051	1,355	1,556
Netherlands	4,249	1,580	623	1,035	1,619
Poland	1,992	833	839	3,388	2,255
Others	14,628	11,763	8,048	8,609	9,420
World	64,053	53,716	41,498	53,511	54,584
Quantity (tons)					
Germany	122,468	125,745	97,057	114,148	101,595
France	2,569	3,473	3,403	3,097	3,735
Netherlands	10,928	5,367	2,121	2,738	3,882
Poland	7,189	4,928	3,593	9,483	7,630
Others	40,054	40,829	25,914	21,603	24,316
World	183,207	180,342	132,088	151,070	141,157

Source: Our elaboration on EUROSTAT data.

has regrettably seen an appreciable decline in Italian performance on such markets. Mean two-yearly foreign trade data (tables 3 and 4) show the appreciable decline of Italian exports and the significant increase in import flows.

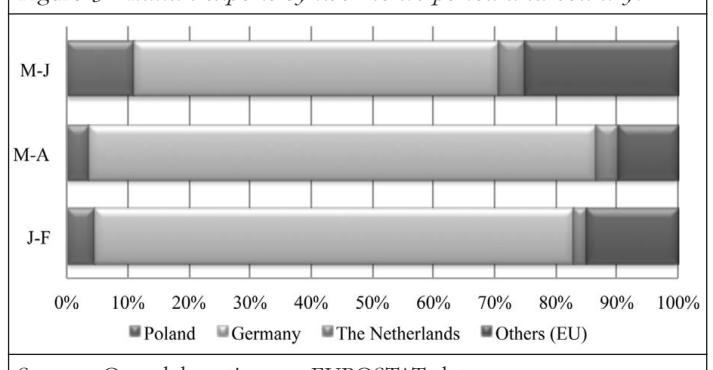
As highlighted, Italy – once a strong exporter in this sector – became a net importer at the end of the decade. The trade percentages underline the clear inversion of trends between imports that increased by 64% and exports which declined by 23%, such that in the period in question the

Table 3 - Early potato imports by country of origin.

Country	2000/01	2002/03	2004/05	2006/07	2008/09
	€ (1000)				
Germany	685	1,060	1,055	1,818	1,722
France	3,434	5,914	6,424	6,226	4,087
Egypt	15,486	22,944	23,808	30,329	34,455
Israel	276	231	626	856	4,249
Others	1,629	2,875	2,085	1,566	1,597
World	21,510	33,024	33,998	40,796	46,110
Quantity (tons)					
Germany	4,937	5,634	7,195	7,432	10,905
France	20,467	29,316	29,737	22,850	20,614
Egypt	60,057	82,387	86,276	98,151	100,736
Israel	754	421	1,974	2,225	11,346
Others	4,644	7,218	6,028	3,904	4,963
World	90,859	124,977	131,209	134,561	148,564

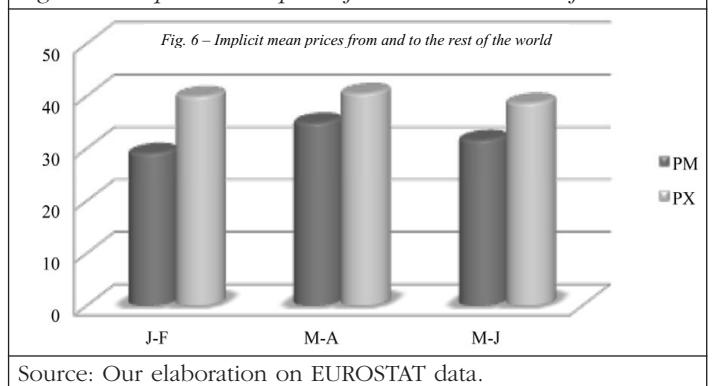
Source: Our elaboration on EUROSTAT data.

Figure 3 - Italian exports by two-month period and country.



Source: Our elaboration on EUROSTAT data.

Figure 4 - Implicit mean prices from and to the rest of the world.

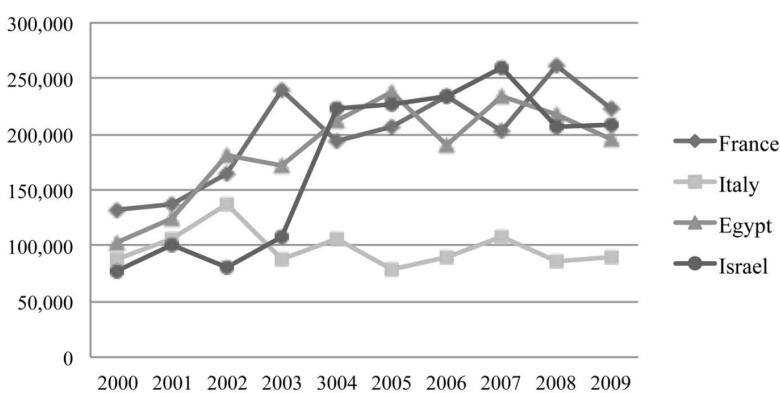


Source: Our elaboration on EUROSTAT data.

³ The Potato Exchange (*Borsa Patata*) was set up under the initiative of the Campania Regional Department for Agriculture with the aim of setting minimum prices for product withdrawal on the part of wholesalers and the Producers' Organisations. It ceased to function due to a number of difficulties encountered.

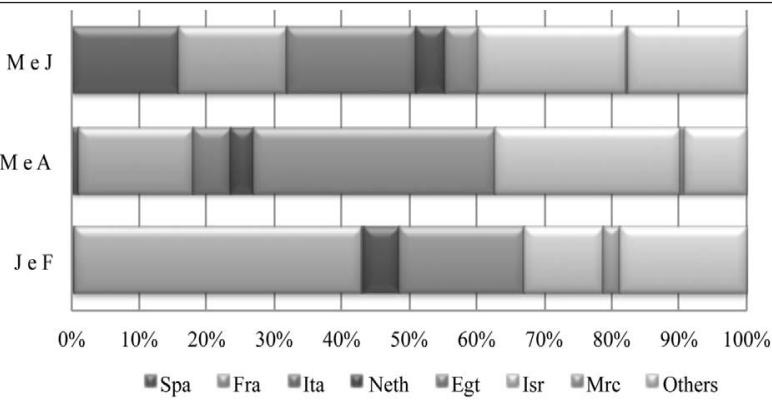
⁴ This is the brand of the Campania Regional Authority which may be used upon a commitment to follow the envisaged protocol. This entails, amongst other things, belonging to the regional integrated production programme. The Regional Authority has undertaken to stipulate a convention with UNICOOP Tirreno for distribution of the product in several regional retail outlets.

Figure 5 - Trend of EU-25 imports (quantity terms, tons).



Source: Our elaboration on EUROSTAT data.

Figure 6 - EU market shares by two-month period.

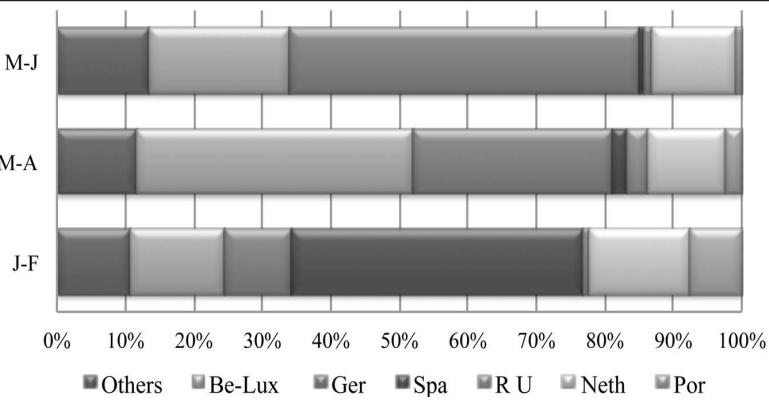


Source: Our elaboration on EUROSTAT data.

normalised balance (index of trade specialisation) that represents an important indicator of international commerce fell from a positive value of 0.32 to -0.11.

A more detailed survey of real flows (quantities) that considers the three two-month periods of trade in the early

Figure 7 - France: exports by two-month period and country.



Source: Our elaboration on EUROSTAT data.

potato allows some in-depth considerations. The first consists in the fact (Figure 3) that the main destination of Italian exports in each trading period is the German market. This characteristic ties product performance dangerously to a single trade outlet.

The second consideration, which is positive, concerns the continuing acknowledged quality of the Italian product, as may be inferred (Figure 4) from information on implicit values (price proxy) which give our export flows the leading edge throughout the trading periods. A cause of concern in the Italian situation is the fact that the EU market, a fundamental reference for all foreign trade flows, has seen – in relation to early potatoes – decisive growth in domestic demand. This has raised the imported quantities from 700,000 tons at the beginning of the decade to over one million tons at the end. In this growth context, as may be seen in Figure 5, Italy's contribution has remained stationary in absolute value and even decreased in terms of market share.

With reference to the latter and considering the three trading periods, the situation in the EU market is represented in figure 6, which indisputably shows that France, Egypt and Israel assume a position of absolute dominance from January to April, leaving margins of a certain significance to Spain and Italy only in the period May-June.

The most surprising thing in this context is not really the position occupied by Egypt and Israel, given both their latitude and the existing conditions in their labour markets, but rather the forceful, diffuse commercial penetration of France which can be explained only by its dominant position as trader rather than producer (Figure 7).

3. The costs of Country-of-Origin Labelling programme

What emerges clearly from the previous sections is the need to focus not only on a structural solution but also on innovative elements that confer to the Italian product such distinctive characteristics that it regains the market shares lost in previous years. In particular, for the reasons mentioned in the previous sections, traceability constitutes one such element. It thus becomes important to ascertain its effect on costs and on the final retail price. In this context, the experience in Campania in the past decade represents an interesting case study, which is also unique in the national context of the early potato. The production chain in Campania, alongside with traditional elements, has made interesting advances in terms of improving production quality chiefly in the production phase and in the subsequent processing-packaging phase. This concerns both large wholesalers and producers' organisations, and consists in testing new cultivars, introducing organic and/or integrated farming, product pac-

kaging and labelling. Hence, the participation in traceability systems, origin and quality labelling which, though it may not have national/Europe-wide recognition, represents a significant attempt at product differentiation in Campania, as occurred with the establishment of the above-mentioned regional label, *Patata Felix*⁵. Compared with the POs, traders are more attentive to the cultivar and processing, packaging and labelling. With regard to packaging, small-sized packages (1.5-2.5 kg) are gaining popularity. Their labels give information on product origin, cultivation type, variety, sorting and advice for use.

During the survey to identify and analyse the costs of the various phases/operations, interviews were carried out at the end of summer 2011 of the main wholesalers and POs operating in Campania, located in the traditional early potatoes production areas. The interviewees obviously also produce and sell the common potato besides other fruit and vegetables. For the purpose of determining costs, the early potato comprises varieties with somewhat different organoleptic qualities, storability and stress resistance, whose production costs may vary significantly. Hence, also selling prices may be highly variable, depending on the cultivar, harvest time and technique, climatic pattern, the specific trading market and even the time of day at which transactions are made. In particular, in the last cropping year, the price of early potato traded in the main fruit-and-vegetable wholesale markets was between a minimum of €20/q and a maximum of €35/q⁶. It may thus be appreciated how difficult it is to reconstruct and interpret costs along the various phases of the production chain. Therefore, in the questionnaires we included an appropriate section for determining the costs incurred in relation to the various production phases, namely transport, processing, packing, storage and certification.

On the basis of the information obtained, the costs were distributed as indicated below⁷. Transport, which occurred only by road, was one of the most important items, accounting for roughly €3-3.5 per quintal of produce. The share of the processing and packing phases depends on the processing carried out and the packaging used. Indeed, these types of costs are those for which the greatest differences were found, varying from a minimum of €2.5/q to a maximum of €5-6/q. This depends on the characteristics of the product that leaves the warehouse. Where the phases of delivery, washing, discarding and sorting of goods are very thorough, as occurs when the product is packed in medium-

⁵ The regional initiative was for several associations a stimulus to take actions, registering their own brand, such as that of *Patata Fresca Campana* of the Campania Patate PO, as a means to relaunch the product for fresh consumption, both nationally and internationally.

⁶ It should be noted that the maximum given is an "exceptional" price that occurred in particular market conditions and with a high-quality product, such as that of the well-presented Agata cultivar.

⁷ The various cost categories include those in relation to work employed, the use of plant and machinery and the various types of packaging used.

small containers (recyclable boxes or bags of 1.5-3 kg but also bags up to 15-20 kg) with a label reporting information on origin and certification, then the cost is the maximum indicated. If, viceversa, less attention is paid to the processing phase because the product is perhaps to be sold by weight, and not by pack, or will be further processed by others, then the cost is decidedly lower.

Considerable variability was also found in storage costs, depending on storage length and method in the warehouse. As is often the case with early potato traded by the interviewees, if the stay is short (a few days), then the cost will be about €2.5/q. However, if the goods have been processed and are to be stored refrigerated for as long as months, waiting to be sold when market conditions improve, then storage costs may even be €5-6/q. Finally, the costs of certification, where present, should be considered. As underlined at the start of the section, in Campania, POs and wholesalers are increasingly joining quality protocols so as to request from the certifying institutes the issuing of relevant certifications. The most common ones concern the production method, integrated or organic production, and traceability of the traded product. The institutes most frequently applied to are ISMECERT, for the use of the regional label *Patata Felix*, and CCPV *Global G.A.P.* certification, increasingly requested at the European level and to which production chain operators belong to consolidate their business relations. The latter is a certification of traceability for the whole production chain, from production to processing and product packaging for the end-consumer. On average, the increase in costs resulting from membership of traceability and quality systems, like those described above, is around €0.23 per kg of product. This amount should be considered inclusive both of higher management costs and expenses incurred for the certifying institute.

4. An estimate of Country of Origin benefits

This part of the research is based on the data collected through a questionnaire, conducted during summer 2011, in other words, just after the end of the market season for early potato. The questionnaire was administered by GFK Euriisko to a representative, stratified sample of Italian consumers, consisting of 1,004 interviewees.

The first section of the questionnaire was introductory, aiming to appraise the purchasing behaviour of consumers towards fruit and vegetables. This section asked exploratory questions concerning the perception of food quality by consumers and their level of knowledge of attributes such as certifications, as well as the importance attached to them.

The second section focused exclusively on the early potato. The interviewees were given a brief illustration of the product characteristics. Questions concerned the frequency of consumption, the country of origin of potatoes purchased, and the importance attached to certain attributes that define potato quality.

In the third section, the respondents were asked to examine a hypothetical scenario based on the following question:

Table 5 - *Attributes and levels.*

Attributes	Levels
Price (€/kg)	a) 0.60 b) 1.00 c) 1.40
Country of Origin	a) Italian product; b) Product is not Italian, but with origin specified on the label; c) No information on the country of origin
Production Technique	a) Organic product; b) Product from eco-friendly agriculture (but not organic); c) Conventional Product
Carbon Footprint (reduction in the emission of carbon dioxide)	a) Product with the emission of carbon dioxide known b) Product with the emission of carbon dioxide unknown
Ethical Certification	a) Fair-Trade product b) No Fair-Trade Certification
Packaging	a) Packed in plastic; b) Biodegradable Packaging; c) Bulk

Imagine you are in a shop where you usually buy early potatoes. Imagine you want to buy early potatoes and you are faced with the following four labels referring to 1 kg of the product. Of the products on display would you choose one? If so, which one?

The labels differed in the levels assumed by six different product attributes, as listed in Table 5.

They were the result of an experimental design, orthogonal with main effects. The choice set generation method

was "Complete Enumeration." Each choice task included four labels plus the no-choice option, and six attributes. The experimental design utilized guarantees the following characteristics: 1. *minimal overlap*. Each attribute level is shown as few times as possible in a single task. If an attribute's number of levels is equal to the number of product concepts in a task, each level is shown exactly once; 2. *level balance*. Each level of an attribute is shown approximately an equal number of times; 3. *orthogonality*. Attribute levels are chosen independently of other attribute levels.

The technique used was that of the choice model, which enabled us to estimate the willingness to pay for each attribute. Emphasis was laid on the country of origin and sustainability.

Table 6 provides the estimation results. WTP is computed as the negative of the ratio between the attribute coefficient and the price coefficient. All the coefficients are significant at 1% level or better. The estimated standard deviations for most of the coefficients are highly significant, which implies that parameters do vary in the sample population. The standard errors estimated for the Eco-Friendly and Organic labels parameters are not significant, meaning that the taste for these attributes tends not to vary in our sample. The sizes of the estimated standard deviations are all reasonable in relation to the estimated means.

On the basis of the estimated price coefficient, the model indicated that COOL was the most important attribute in choosing early potato, far more important than attributes such as fair trade, organic, carbon foot-print, and biodegradable packaging. WTP estimated for this attribute was somewhat high, indicating a strong preference of Italian consumers for early potatoes of Italian origin.

5. Impact of Italian early potato COOL protocol on the national market

In this section, we present the empirical methodology adopted and the results of simulating the effect that the adoption of early potato traceability could have on the market for Italian fresh vegetables. In order to address this topic, a system of demand functions was built on real household consumption data (3,000 observations) statistically representative of the Italian population of households. In the demand system, the introduction of the new traceability procedure was explicitly implemented. Own and cross price elasticities, as well as other relevant measures of market variables, were estimated, by means of a demand system, for a large set of fresh vegetables (potatoes split into

Table 6 - *Mixed Logit parameters estimates.*

Attributes	Mean	Std. Dev.	WTP(€/kg)
Price	-0.719	0.058	-
Not Italian- origin known	0.591 (0.066)	0.631 (0.094)	0.822 (0.877)
Italian origin	2.236 (0.073)	1.45 (0.072)	3.11 (2.01)
Eco-friendly	0.162 (0.055)	0.067 (0.163)	0.225 (0.093)
Organic	0.285 (0.052)	0.053 (0.154)	0.396 (0.073)
CO2 emission known	0.409 (0.040)	0.321 (0.091)	0.568 (0.446)
Fair Trade	0.390 (0.044)	0.552 (0.077)	0.542 (0.767)
Plastic pack	0.404 (0.055)	0.521 (0.020)	0.564 (0.724)
Bio pack	0.411 (0.053)	0.224 (0.188)	0.572 (0.311)
Value of the Log-Likelihood at convergence	-6078.80		

early and late, cabbage, lettuce, mushrooms, roots, asparagus, onion, tomatoes, peppers, cucumbers, beans, courgettes and others).

Demand system estimation focused on early potato but, since we implemented a system of equations representing a large set of fresh vegetables, a larger amount of information for a wider set of products was obtained. From an empirical point of view, a two-step censored demand system (Shonkwiler and Yen, 1999) based on the non-linear AIDS (Deaton and Muellbauer, 1980) was used. The following results are also illustrated and discussed analytically by Caracciolo and Cembalo (2010).

The parameters estimated by the demand system provide indications of the effect of the early potato price increase on the demand for complementary and substitute goods. This effect was measured in terms of direct (-0.57) and cross elasticity. The substituted products were the common potato (0.16), fennel (0.13) and legumes (0.12). While the complementary products include lettuce (-0.07) and other vegetables (-0.08). With regard to the simulation, we implemented the previously estimated parameter, including the adoption of traceability in the model as a "pure cost" t increasing by a quota s , the sale price, of the product concerned ($t = s \times P$).

Our analysis included only, *ceteris paribus*, short-time effects without considering a possible higher consumer WTP for traced products. Parameters s are taken up from the scientific literature, choosing a small interval around the nominal value of $s \times P = €0.07/\text{kg}$ ($s = 0.05$; $s = 0.07$; $s = 0.10$; $s = 0.15$). Table 7 shows the simulated traceability impact on household food consumption for the different values of t . Our model empirically confirmed the hypothesis that the common potato is, in terms of dietary habits, a direct substitute for its early counterpart. In the presence of similar prices between the two potato types, the increase in price scissors would amplify the substitution effect. According to our findings, consumers think the common potato is a slightly inferior good to the early potato. Depending on the type of traceability adopted, consumption in quantity of the early potato could fall by 3% to 7% in favour of the common potato. The

implication is that the early potato is already considered a superior good but an increase in the price scissors, in favour of the common potato, would have a significant effect on early potato consumption. Nevertheless, the costs found in our study suggest that the effect on the market is almost wholly negligible (€0.23/q). Moreover, if a high consumer WTP for the "Italian potato" attribute were to be confirmed, as we indeed estimated, the effects on the market of the cost increase would be fully counterbalanced by consumer WTP.

6. Concluding remarks

In this study the possible impact of a COOL policy on the early potato sector was assessed. A cost-benefit analysis framework was implemented in which farming profitability, supply chain organization, international trade environment, and consumer side (benefit) studies were taken into account. Our research showed that a COOL policy in Italy's early potato sector could enjoy broad margins of success. There is a very wide differential between the costs of traceability and Italian consumer's willingness to pay for a traced product, so wide as to be able to predict that any market price increase would produce a minimal, or even, zero reduction in demand for this product. While certification of origin should be considered a necessary condition for relaunching early potato production in Italy, it is not sufficient to recover competitive margins on markets in Italy and in the rest of Europe. The early potato sector should focus not only on production diversification, seeking to bring forward harvest and sale, but also on better organisation and integration between the various phases in the production chain. In effect, a suitable differentiation strategy would involve conferring distinctive characteristics to the products that are important for the consumer and can increase the perceived value. For this to happen all the operators in the production chain need to be actively involved. This would be possible in the light of the measures implemented within the framework of Rural Development Programmes 2007-13 in the Italian regions traditionally producers of early potato (Panico *et al.*, 2009).

Regrettably, the experience we acquired in the course of this survey suggests that a particular feature of the early potato production chain lies in the substantially marginal role played by the production phase. The choice of how much and what (variety) to grow are operative inputs that the grower "performs" in a context of information asymmetry, while all the *faire valoir* is shifted post-harvest. This circumstance represents the main cause underlying the difficulty encountered when adopting quality labels and, more generally, quality enhancement policies. Otherwise it would be impossible to explain the excessively wide gap between the costs of certification and brand management (contents) and important values of the WTP resulting from our survey.

Table 7 - Early potatoes price change simulation, percentage of positive consumption, quantity consumption (Kg.) and percentage variation.

	Fresh Veg. Group	Household purchasing (%) and percentage variation		Quantity consumption (Kg.) per household per year and percentage variation
Benchmark	Potatoes	92.7		26.11
	Early Potatoes	51.8		3.34
$t = 0.05\text{Price}$	Potatoes	92.7	0	+0.21
	Early Potatoes	51.4	-0.8	-0.09
$t = 0.07\text{Price}$	Potatoes	92.7	0	+0.29
	Early Potatoes	51.2	-1.2	-0.12
$t = 0.1\text{Price}$	Potatoes	92.7	0	+0.40
	Early Potatoes	51	-1.6	-0.18
$t = 0.15\text{Price}$	Potatoes	92.7	0	+0.59
	Early Potatoes	50.7	-2.1	-0.26

Appendix I

Method for calculating farm business results

The method adopted for determining farm business results (production cost and profitability) is based on the calculation of the Reference Production Cost (RPC) understood as the sum of Explicit Costs (EC) and Implicit Costs (IC). The former includes various outgoings, quotas and taxation, while the latter comprises payments attributable to the owner for the production factors given by him/her. In the cases analysed, such factors concern operating capital, land (75% of the sample farms), management and administration. One part concerns explicit costs that have a specific nature (wages, equipment and rentals); another part comprises the expenses connected with use of buildings, plant, machinery and tools, which were attributed in relation to the degree of use of each building and each machine by the production process in question. A third category refers to the general expenses incurred by the farm overall, attributed in relation to the economic importance of the production process.

For the calculation of implicit costs, use was made of the concept of opportunity cost to set the remuneration to attribute factors given by the owner. The sum of remunerations, termed Reference Net Income (RNI), obtained by multiplying the relative Reference Unit of Remuneration (RUR) by the quantity of each factor used, constitutes total implicit costs. The management and administration function was estimated in relation to the economic importance of the production process. The RURs were set, taking account of the national farm workers contract for work, the yield on State bonds for operating capital, and rentals applied in the study area for land. Thus, the Reference Cost of Production is determined as follows: $RCP = EC + RUR$

Overall assessment of profitability was obtained from the Profitability Index (PI), given by the NI/RUR ratio, i.e. from the comparison between actual Net Income and expected net income. Total remuneration to be attributed to each factor results from splitting the NR among the same factors, in direct proportion to the composition of the RUR. Actual remunerations, both total and unit, were thus obtained by multiplying the corresponding reference remunerations by the PI (De Pasquale *et al.*, 2010).

Appendix II

Method for determining benefits of a traceability system

Benefits from a traceability system that allows conservation of the place of origin were estimated with a stated choice model in which the decision maker faces repeated choices among a number of choice sets. The utility function is specified as $U_{nij} = \beta_n^T x_{nij} + \varepsilon_{nij}$, with $n: 1 \dots N$ that varies over respondents, $j: 1 \dots J$ varies over the alternatives and $t: 1 \dots T$ varies over the choice sets. The vector x_{nij} contains all the

observed variables given by the attributes of the alternatives as faced by the decision maker. The vector β_n is a vector of unobserved coefficients; they are constant for each choice situation but, by varying over decision makers, represent each person's taste. They are random parameters and follow the population distribution $f(\beta | \theta)$, where θ are the parameters of the distribution.

The ultimate goal is to estimate θ , the population parameters, that is, the mean and covariance of β_n . Indeed, in this model, tastes vary over people, and if we know the population parameters, it will be possible to know the distribution of the individual parameters (Cicia *et al.*, 2012b). Other advantages of using the random coefficients approach, as opposed to fixed parameters as in the standard logit, is that the restrictive property of "independence from irrelevant alternatives" is not displayed, and it allows for very general substitution patterns over alternatives and time, captured by the correlation matrix.

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