JOURNAL OF
BUSINESS
&
FINANCE

Journal of
Business
&
Finance

Vol. 01 No. 01, 2013

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THE NEW TENDENCY IN THE DEVELOPMENT OF THE EUROPEAN UNION COMMON TRADE POLICY DURING THE WORLD ECONOMIC CRISIS

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A B S T R A C T

It is emphasized that the trade liberalization has a special positive significance in the global context. Due to technical progress and to the growth of economic ties between particular countries, participants in the world economy, the benefits resulting from liberalized international trade and from the freedom of movement of foreign direct investments become bigger not only for the industrialized countries but also for the so-called "emerging markets", that is, the countries that find themselves on the stage of the accelerated development. Another situation was during the world economic crisis like 2008-2010. The international trade policy and also the Common Trade Policy of the European Union in the end of the first decade of the XXI century have been strongly affected by the force of the economic crisis. The changes are evident in the growing importance of international trade to national economies and to domestic groups within those economies, in the closer linkages between trade and other international issues. Realistic point is important trends in the global trade regime during the economic crisis. The growing interdependence have led to increased competitiveness and greater temptations to resort to strategic trade policy. In the situation of economic crisis different positions of the member states of the World Trade Organization (WTO) especially developed and developing countries and also USA, the European Union and Japan representatives were observed during the Doha Round of trade negotiations under the WTO. The problems of agriculture protection in the developed countries for example in European Union and USA and also in the developing countries, were becoming a serious obstacle during the negotiations. Despite the undeniable benefits of the multilateral WTO forum for trade liberalization, the rapid increase of North-South bilateral and multilateral Free Trade Areas (FTAs) begs a systematic explanation for why some forums are prioritized relative to others. The main aim of the article is the presentation of the new tendency in the development of the European Union Common Trade Policy during the world economic crisis. In the article presents the tendencies to bilateralism in the foreign trade policy during the economic crisis, the problem of public choice in the foreign trade policy, protectionist pressures in different political systems, the level of protectionist pressures, food producer's pressure and conflicts between the tendencies to international trade liberalization and environmental protection.

Keywords: European Union, new tendency, trade policy, economic crisis.

INTRODUCTION

The decisions taken by the representatives of the governments participating in the World Trade organization (WTO) are, to a significant degree, influenced by various lobbies, such as organizations and unions of food producers or other non-governmental organizations, including trade unions. The problems of mutual relations between the representatives of governments and those non-governmental organizations which influence on multilateral trade negotiations conducted on the forum of WTO are the subject of the analysis in the undertaken research program, while special attention has been paid to the trade conflicts between the European Union and the United States of America. Lang hammers (1991) underline that the biggest confrontations within WTO involved agricultural problems. They could also be observed in other areas, such as steel industry, textile industry or in an environmental protection. There are serious conflicts existing between the idea of international trade liberalization and environmental protection since one has to consider what is more profitable - environmental

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protection or international trade liberalization. Different positions of the USA and the European Community representatives could be observed during the round of trade negotiations. The governments of those two economic powers found themselves under a significant pressure of food producers who had serious difficulties with the sale of agricultural products surplus in the situation of the limited world market and lower prices. The problems of agriculture protection in the European Union, the protection resulting from the Common Agriculture Policy (CAP) of member countries, were becoming a serious obstacle on the way to the final decisions (Anderson, Martin 2005).

1. The tendencies to bilateralism in the foreign trade policy during the economic crisis: The tendencies in international trade development can create changes in domestic markets, placing pressure on political actors to obtain aid from the government especially during the economic crisis. There are also the groups which want to coordinate activities and change foreign trade policy. Government provide the justification for protection of the domestic market to response to global competition. Essentially, the government appears to supply protection for affected parties; yet, the overall impact on consumers, producers, and foreign competition is neglible (Thies and Porche, 2007:172). Significant government ownership of the productive resources of a country has a negative effect on trade liberalization, while fragmentation of decision-making authority, expressed as fragmentation within the government and pluralism in society, has a positive impact on the libaralization of trade policy (Kennedy, 2007:165).

In the area of foreign-policy analysis has focused on "three i's": interest groups, international structure, and ideas (Kennedy, 2007:146). In the interest's groups literature, government policy is viewed as the outcome of competition between groups for trade policies that benefit their industry (Nau, 1989), (Milner, 1995), (Milner and Yoffie, 1989:239-272), (Schattschneider, 1935). International structure suggests that freer trade was a reflection on U.S. interests and its hegemonic status after World War II, while a decline in free trade is a reflection of the U.S.'s hegemonic decline (Krasner, 1976:317-347). The literature on ideas suggests that policy beliefs are reflected in laws and institutions. These laws and institutions, in turn, carry a type of interia that continues to influence policy outcomes long after changes in international and domestic structure

would predict policy change (Goldstein, 1989:31-71), (Goldstein, 1995). In contrast to these explanations government interests in the economy and in maintaining stability also play a large role in trade policy (Kennedy, 2007:146) especially during the economic crisis.

At one end, a multilateral forum with near universal membership offers maximization of gains from trade and reduced transaction costs. However, a single state cannot expect to have much control over trade partners or liberalization agendas at the multilateral level. At the other end, a bilateral FTA often yields very small gains from trade and usually increases transaction costs by producing idiosyncratic sets of rules. But at the same time, a large state can acquire a high level of control in terms of partners, issues and agenda selection, and sectorial exclusions or inclusions based on domestic political needs (Pekkanen, Solis, and Katada, 2007:962). One can contend that industrialized of aggregate economic gains in the interest of national welfare (largest in multilateral forums) or seeking control over rules in line with political interests (greatest in bilateral forums).

The liberalizing rules on agriculture, and other less competitive sectors, are no longer an acceptable political price for the economic gains bundled across sectors (Interview MOFA, 2004, New York Times, 2007). In the on-going Doha Round, the agreement to end agricultural subsidies by 2013 calls for a substantial part of these subsidies to be eliminated well before then. Yet, this sort of vague statement fosters uncertainty for domestic actors at home in uncompetitive sectors like agriculture and in several cases like for example in Japan trade officials need to show that they have more concrete control for political reasons-an element more credible in a bilateral setting than a multilateral one (Pekkanen, Solis, and Katada, 2007:962). This situation may also indicate the back from globalisation to the mercantilist tendencies in the foreign trade policy during the economic crisis.

2. The problem of public choice in the foreign trade policy: Traditionally, political economy models of trade policy have tended to focus on the demand for protection, with factor endowments driving political reactions to exposure to international trade. Such model simply assumed that adversely affected economic agents would organize to seek protection, which would be afforded to them by their elected representatives in the political system. The supply side

for trade policy was either ignored or underspecified in most models (Thies and Porche, 2007:172).

In the foreign trade policy theory interesting are the reviews of Alt et al. (1996) and Nelson (1988) about the demand for trade policy in terms of the theoretical importance of factor specificity (Alt et al., 1996:695), (Nelson, 1988:806). Factor specificity refers to the ease with which factors (land, labour, and capital) can move from one sector to another in an economy. The two dominant approaches to explaining the demand side of trade policy used radically different assumptions about the specificity of factors. The Heckscher-Ohlin model, used by Rogowski (1989) in his seminal contribution "Comers and Coalitions", assumes very low-factor specificity (Rogowski 1989). The low specificity of factors means that factor returns are equalized throughout a region's economy. Producers should export goods that intensively use their abundant factors and import goods that intensively use their scarce factors, with the result that owners of abundant factors will favour free trade and owners of scarce factors will favour protectionism. Trade policy coalitions will therefore be organized along factor or class lines. On the other hand, the Ricardo-Viner assumes that some factors are stuck in their present uses; therefore, factor returns are not equalized throughout a region's economy, but are industry specific. Trade policy coalitions should form along the lines of exporting versus import-competing industries.

Neither of these models explains how preferences over trade policies are actually translated into political action (Alt et al., 1996:695). In a discussion of the endogenous tariff literature, Nelson (1988) notes that the mobility costs of the specific-factors model may be a result of productivity differentials, labour union activity, or individual preferences for membership in a given geographic area, industry, or firm (i.e., some form of solidarity) (Nelson, 1988:806). In all of these cases, one can derive a link to preferences for tariff policy, "but without additional information on why the specific-factor model is chosen, it does not tell us much about political organisation".

Alt et al. (1996) suggest that one can begin to understand this process by assuming that rational individuals make cost/benefit calculations. The Heckscher-Ohlin and Ricardo-Viner models tell us the benefits that individuals hope to receive, but the costs of collective action also intervene as they organize to achieve those benefits in the political system. Olson

(1985) argued that small groups with specialized interests are easier to organize and more effective in securing economic rents than large groups with diffuse interests (Olson, 1985:928-937). Small groups are better able to control free riders than large groups, and groups with specific or homogenous interests can more easily coordinate and target their activities than groups with diffuse or heterogeneous interests. This approach is thought to explain the success of agricultural producer groups in developed countries in organizing for protection as well as the inability of agricultural producer group to organize in developing countries (Anderson, 1995:401-423), (Coleman, 1998:632-651), (Olson, 1985:928-937), (Olson ,1986), (Sheingate, 2001).

However, Nelson (1988) points out that we should not assume that organized interests will be equally responsive to all issues (Nelson, 1988:807). Institutionalized interaction among actors may help to explain systematic patterns of action, especially as institutions created for specific historical purposes may outlive those purposes. Alt et al. (1996) suggest that if a particular group has paid the fixed costs of establishing collective action and developed well-worn channels of access to public officials, it may defend its trade policy preferences even when the stakes are low because the marginal costs of action are low (Alt et al., 1996:696). It may be the case that "a much more affected but inchoate group does nothing because the start-up costs of organization are too daunting". Past strength of an organization should therefore be an important intervening variable predicting group action on trade policy. Further, as Nelson (1988) argues, once these institutions exist, supply-side interventions may also affect their usefulness as some are deemed legitimate or illegitimate aggregators of interest (Nelson, 1988:807). Thus, we must examine the way in which economic institutions and political institutions interact. Most economic models simply assume that a model of the economy is a model of the demand side for trade policy, but Nelson (1988) suggests that we must elaborate the mechanisms by which demand is articulated to the suppliers of trade policy (Nelson, 1988:810). For a good overview of this argument, especially as it pertains to agriculture (Thies and Porche, 2007:172).

If the political systems rewards small sectorial groups, than individuals will not pay the costs of organizing large intersectional coalitions. If the political system

rewards large mass movements (i.e., majoritarianism), than individuals will have to pay the costs of organizing large intersectional coalitions in order to achieve any benefits. Collective action costs and political institutions are interactive with factor specify. They suggest that Rogowski's (1989) Heckscher-Ohlin framework requires low factor specify, low collective action costs, and domestic political institutions that favour mass movements (Rogowski, 1989). The Ricardo-Viner framework used by the endogenous tariff literature requires that factors are specific, collection action costs are high, and institutions are less majoritarian, with changes in any of these three variables also affecting the type of coalitions that form.

In the state as a rational dictator model, the state may be seen as either pursuing "good government" goals along a social welfare function or intervening in the economy for their own self- interested model of the state views politicians as offering preferential trade policy to economic actors in exchange for political support (Magee, Brock, Young, 1989), (Grossman and Helpman, 1984:833-850). On the other hand, pluralist theory typically views the state as a neutral aggregator of demands from groups in society. The supply of trade policy is then determined by the balance of power on any given issue. The supply side of trade policy is relatively undeveloped theoretically, and yet a crucial part of the equation. A variety of different characteristics of the political system are posited to affect the supply of trade protectionism, such as politicians incentives to cultivate personal votes, the size of electoral districts, party fragmentation, federalism, presidential versus parliamentary systems, and so on (Nielson, 2003:407-491), (Rodrik, 1995), (Rogowski, 1987:203-222), (Rogowski, 1987:1121-1137).

On a theoretical level, understanding the choice of trade policies in countries is very important. A survey of economists in 1984 suggested that one of the few things they agreed on was that, under most conditions, tariffs, and quotas reduce the general welfare (Frey, 1984:986-994). The stubbornness of protectionism in the face of international and academic pressure against it has led economists to seek explanations. These explanations range from the simple ignorance of politicians to arguments about the rationality of protection for "infant industries" and "optimal tariff levels" in developing states. Faced eighth this frustrating question, scholars have increasingly turned to political answers in order to explain the choice of what would seem to be an "irrational" policy (Frey, 1984:199-223), (Nau, 1989), (Nelson, 1988:796-837).

3. Protectionist pressures in different political systems: It is important to indicate, that the role of trade unions in different political systems may be, to a high degree, different. In authoritarian systems it is, as a rule, smaller than in democratic systems (Banerji and Ghanem, 1997: 173). It would seem that if protectionist pressure on the part of trade unions is weaker, the situation for economic growth is much better. Following that line of reasoning we could come to conclusion that the authoritarian system is better for the effectiveness of the labour market especially during the economic crisis. The examples of Chile, South Korea, Singapore and Turkey from the seventies and early eighties could confirm that point of view. In many cases during those two decades the authoritarian regimes persecuted trade unions and put restrictions on basic labour rights. During that period of oppression, South Korea, Singapore and Turkey experienced a spectacular growth in the sector of processing industry and in the growth of demand for labour. Growing profits and the demand for labour in a processing industry caused a general growth of prosperity of the employed. Although similar results were not noted immediately during the authoritarian phase of development in Chile, a number of observers express the opinion that the reforms introduced at that time helped to reorganize Chilean economy in the nineties. The application of democratic rules, on the other hand, may lead to lower productivity of labour force. In a number of years different democracies had to use significant financial resources for the employment of those who belonged to trade unions like for example in the European Union.

Banerji and Ghanem (1997: 173) underline that a different point of view says that government legislation concerning the labour market may be applied more effectively in an authoritarian system than in a democratic one. The authoritarian regimes often make use of individual interests of given circles. In most democratic countries there is no broad enough bases that would allow using labour market policy for gaining the support from pressure groups, the urbanized labour marked elite included. The major difference between authoritarian and democratic regimes lies in the level of the outside influence. In a well-functioning democracy, the outside opinions are also taken into account and there occur some limitations which come from the

outside, which restricts the achievements of given groups of interest. In a dictatorship, a government cares only that those groups are not too strong.

There are, however, a number of democracies among the industrialized countries where an effective labour market exists. There is also a number of democracies with effective labour market policy among the developing countries. Similarly, in the countries in which the transformation from the authoritarian regime towards a democracy is taking place, avoiding unfavorable phenomena on a labour market is often a priority. For example, the Chilean government moved towards democracy and to free trade unions without home income growth. The end of oppression in South Korea, in 1987, started the partnership relations in full of conflicts industry (Banerji and Ghanem, 1997: 173).

It is worth considering which of the two points of view presented above should be given support, that is, which of them is the proper one. The analysis of that problem may be based on the Grossman and Helpman model (Grossman and Helpman, 1994: 833 – 850). This model describes economic development on the basis of two sectors - urbanized, regulated processing sector, and rural, unregulated agricultural sector. The protection of the labour market, especially of minimum wages, is usually applied in order to bring the benefits for the employees of the regulated sector, since the sector of unregulated employees does not come under the legislation concerning the labour market.

The sector of regulated employees, and also the owners, demands from the government that it leads an economic policy that is favorable to them. The employed demand high minimum wages, while capitalists demand high profits. Both groups demand the restrictions on the degree of economy openness. In a closed economy, higher market minimum wages and higher profits are usually connected with higher prices for home consumers, and this is not easy when those consumers are free to buy the substitutes in form of imported goods. Thus, incomes in an economy may be created by protection and later divided among the employees of the regulated sector and the capitalists, although sometimes the government itself takes a part of those incomes (Banerji and Ghanem, 1997: 173).

A government conducting an economic policy takes into account a number of factors. Firstly, it has to decide the degree of obtaining the resources, that is, how much from those resources it wants to obtain. Hence the importance of investments and of future economic growth, and also of defining the possibilities for keeping the power it is currently holding. Secondly, the government should define the scale of support from each of the pressure groups that can influence the situation. The position and importance of each group for the development of political processes should be considered. For example, in the country where the regulated labour market is divided, and politically weak, only the capitalists may have a deciding voice in political processes. And the contrary also happens - in the societies where the labour market is organized, it may play the important role in mobilizing voters.

How can we recognize the type of power, the type of rule? First of all, we should investigate what level of resources a given government is going to achieve. If an authoritarian government is more or less corrupted than a democratic one, it will be creating the income, to a bigger or lesser degree, through protectionism. It will also appropriate some part of that income. Secondly, a given type of government may remain under the influence of different pressure groups. If an authoritarian government is trying, to some extent, to subordinate special pressure groups including the regulated labour sector, it will be, to some extent, generating incomes through protection and it will be turning over some part of them to those special pressure groups.

4. The level of protectionist pressures: The above arguments show that the policy is defined by political factors (including the type of the government and the burdens resulting from obligations towards employees and capitalists), and by economic factors (wages, prices, the structure of production and consumption). On the basis of the present discussion, we can present two equations, one pertaining to the level of protection, and the second pertaining to the national economy and deformation of wages.

1) $\pi = f(e, l, k, R)$

2) $\varphi = f_1(\pi, e, l, k, R)$,

The level of protection (π) depends on the economic parameters (e), a relative political importance of urbanized employees and capitalists (l and k, respectively), and on the type of the government (R). Deformation of wages is, on the other hand, the function of π and of e, l, k and R. In case of a small economy, economic parameters that can influence π and φ include flexible consumer and producer prices, demand flexibility, wages and the demand for labour

force, and also the price of goods on an international market.

One can expect, a priori, that the growth of π is dependent on l and k. If interest groups become stronger, the pressure to form incomes based on protectionism may become stronger. The influence of R, that is, the influence of a political authoritarianism on the level of protectionism, that is, π, depends on the fact whether the opinion, that the level of protectionism depends on the effects of democratization, is correct. It is also thought that the increase of the deformation of wages depends on π and l, while its decrease depends on k. As long as the incomes are obtained from trade protections, those incomes can be handed over to urbanized employees. An important problem in case of urbanized labour force as an interest group with growing strength is the fact that urbanized employees may gain a big share in the division of incomes but the growth of political importance of the capitalists may cause that the shared incomes, handed over to the labour force in regulated sectors of economy will become smaller (Banerji and Ghanem, 1997: 173).

There is no doubt that it is easier for wealthy rather than poor societies to choose democracy (Helliwel, 1992). Since those wealthier societies at the same time have a tendency to a bigger openness, the direction of cause-result events may run from the openness of society to the political system, and not, as was suggested earlier, in the opposite direction. The research showed also that the level of education plays an important role in this respect. The countries with a higher level of education of labour force are more open.

On the basis of the earlier considerations, one can come to the conclusion that authoritarian systems have a tendency towards a broader application of protectionism than democratic systems, and that, in turn, the trade restrictions accompany significant deformations of wages on the labour market. This opinion may be justified on the basis of the observations of the situation in a number of countries.

Freedom of association is one of the elements of good management and the necessary condition for development. The authoritarian governments do not respect, however, the freedom of association, which is connected with the policy of trade restrictions and with the deformations on the labour markets. One cannot state, however, that improper or ineffective policy on the labour market belonged exclusively to authoritarian regimes or that authoritarianism automatically

generates this kind of policy. There is a number of examples of authoritarian countries which do not conduct policies of that kind. The works of such authors as Fields or Freeman show that the repressions against the labour force are not necessary, if one wants to achieve a required economic growth (Fields, 1994; see also Freeman, 1993).

Finally, it should be pointed out that there exists a close relation between democracy and an economic growth, There is well known examples of open societies that stimulate the economic growth. This is true mainly in case of highly developed and strongly urbanized countries. In the countries with a developed democracy, the pressure groups have a bigger opportunity for acting. The research shows that the presence of trade unions helps to accelerate the economic reforms (Devarajan, Ghanem, Thierfelder, 1997: 145 – 170). The benefits resulting from liberalization of the international trade are bigger when the trade unions exist in the sector of the economy under protection. The growth of import abilities leads to the decrease of wage pressures, and when the trade unions agree to that, such a situation allows for a better allocation of labour force in the economy. This is true both in the case of active and passive trade unions, although the effects are better in case of active trade unions.

The trade unions active on an urbanized labour market had a significant influence on the decisions of governments, in the course of multilateral trade negotiations within WTO. It was especially evident in the negotiations on lowering customs duties and non-tariff measures in steel, shipbuilding, textile and clothing industries, and in coal mining. In the so-called "sensitive" industries, which, for example, in the European Union were under special trade protection, the position of trade unions was very strong.

5. Food producer's pressure: The biggest conflicts between the United States and the European Union within WTO were caused by agricultural problems also during the Doha Round and last world economic crisis. The governments of the two economic powers were in many times under a very strong pressure of food producers. The problem of liberalization of agricultural products trading is linked to the problem of subsidies application. According to the WTO decisions (art. XVI), exports of the agricultural products, as so-called basic goods, can be subsidized, if this fact does not interfere with the economic interests of other participants of the agreement. Actually, subsidizing exports of agricultural

products may have many different forms, starting with a direct subsidy, through variable compensatory fees, and finally through various forms of government guarantees and preferential credits. In the ministers declaration we read only about a better discipline among the members of WTO. The total prohibition of subsidies would be the simplest course, but it does not seem to be realistic may be after 2013.

In an effort to limit the EU budget expense for subsidizing agricultural products, it was decided, among other things, that in case of fats, the money will be transferred from the processing sector to the production sector. Instead of compensating the industry for higher costs of purchasing more expensive, local raw materials (the prices paid to the growers of rape or sunflower in the EU are much higher than the world prices), it was decided that subsidies would go directly to farmers, and the size of farms was to be the basis for calculations. At the same time, the Union authorities disclosed that they will be trying to reduce gradually those expenses by reducing guaranteed prices.

This reform was the first in which the attempt was made to eliminate the structural surpluses, the surpluses which had been disorganizing the EU agricultural market and the international trade for many years. It is worth pointing out here that the direct result of announced changes in the agricultural policy of the EU may not be favourable in the abroad. The simplest form of compensation for farmers is usually the restrictions for the suppliers from abroad. The agricultural lobby in France is especially active in this area. As a result of its activity and the pressure exerted on the government the agricultural goods from abroad have been successfully blocked from the EU market. The position taken by that agricultural lobby influenced also the position of the EU representatives in the debates on the agricultural questions during the multilateral trade negotiations also in the framework of the Doha Round.

In spite of the trade conflicts, most clearly visible in the USA - the EU relations, all the countries participating in the international trade were interested in the successful of the international trade negotiations. The reduction or the elimination of trade restrictions stimulates significantly the growth of the world trade exchange, while the foreign trade, in turn, is an important factor of the economic growth of individual countries especially during the economic crisis.

6. The respond of the European Union to the crisis:
Despite a rapid response of the European Union to the crisis and advanced reforms, including on financial markets and in economic management, the crisis may have lasting impact on the potential economic growth and unemployment, and thus be considered prejudicial to the living conditions of the Europeans and for their future. In order to solve this problem, the European Union adopted a strategy "Europe 2020" and has set itself ambitious targets for intelligent and sustainable development, inclusive. But these objectives will only be achieved, provided that the Union and the member states shall carry out urgent structural reforms. Priority must be measures which support economic development and employment. It is necessary to pursue in connection with this proactive and a cross-cutting strategy. The aim is to put an end to the market fragmentation, remove the obstacles and barriers hampering the movement of services, innovation and creativity. These actions should reinforce a uniform internal market the EU and outwards to enhance the competitiveness of the global primarily in relation to the USA and Japan as well as emerging markets such as Brazil, Russia, India and China (BRIC). This should be done mainly by an increase in the financial outlay on research and development (R&D) and the development of new knowledge-based economy.

In a global financial and economic crisis in 2008-2010 started to prevail also protectionist tendencies which accompanies economic recession. Weakened has the same time, the impact of multilateral trade agreements on the processes of liberalisation of international trade in the framework of the WTO and increased the importance of bilateral agreements and regional agreements. The increase regionalisation of economic cooperation and the bilateral agreements between particular countries is a kind of behaviour with which many countries react to the challenges posed by the world economic crisis. Strengthening of already existing regional groups like European Union, creating new agreements and new trade blocks causes a specific "fragmentarisation" of the global economy. The increase of economic ties between such groups and countries is the effect of economic crisis.

The intensification of regionalising process in the European Union and bilateral tendencies in the years of economic crisis resulted from a certain definite policy of the governments of particular countries. European Union have become a useful institutional basis for the

stimulation of economic growth on the territory of a number of thus associated countries, and for a specific preparation of the economies of those countries for a more competitive conditions on the world market. In the conditions of growing influence of international situation on the economic development, less developed countries also perceive the integration with highly developed countries like European Union as a good solution, seeing in it not the threat but the chance for the acceleration of their own economic development.

These new trends also concern the Common Trade Policy of the European Union. This has been reflected in the growth of bilateral agreements, for example, between the European Union and ASEAN countries and in the proposals for creating a transatlantic free trade area between the European Union and the United States of America. In such a situation occurs to the liberalisation of trade within the framework of bilateral agreements and in a lesser extent in the framework of the multilateral system of international trade of the WTO.

In financial matters and international trade has increased markedly role and the importance of the G20 group. In the new situation both the WTO and the G20 should jointly take and coordinate the efforts to the principles to promote open international trade, widening access to the global market developing countries. By supporting open trade rules in the global system strengthen will be legitimacy of the functioning of the G20 group.

CONCLUDING REMARKS

The international trade in the end of the first decade of the XXI century has been strongly affected by the force of the economic crisis. The changes are evident in the growing importance of international trade to national economies and to domestic groups within those economies, in the closer linkages between trade and other international issues. Realistic point is important trends in the global trade regime during the economic crisis. The growing interdependence and the decline of USA trade hegemony have led to increased competitiveness and greater temptations to resort to strategic trade policy.

Trade policy takes on additional importance in economic battle of "the valiant liberal reformers, fighting against self-dealing rent seekers profiting from inconsistencies of the transition economy" (Aslund, 2002:19), (Kitschelt et al., 1999). Many of the clienteles policies that shelter rent seekers are impossible to maintain in the face of competition in the international economy. On the other hand, high tariff walls, export licensing, and artificial exchange rates provide numerous sources of rents for business people who are trying to promote their own loyalties.

The trade policy plays a key role in the maintenance of both economic and political liberalization (Frieden, 1999), (Frieden and Rogowski, 1996), (Rogowski, 1987:203-222). The prominence of rent seeking in a country can have far-reaching implication for its economic development. Especially in underdeveloped or transitional countries, rent seeking takes scarce resource out of productive areas in the economy, using them to promote and/or perpetuate further rents (Murphy, Shleifer and Vishny, 1993:409-414).

Structural and micro-political economy analyses of foreign trade policy have missed the impact of changing ideas about protectionism and relatively unchanging institutions designed to handle domestic producer complaints. The political consensus on the supply of trade policy and protectionism has changed over time. In the economic depression tariffs revenues and protectionism played important roles in the politics of political parties. At the same time in the market economy even during the economic depression one can observe a little support for liberal trade policy. It is necessary to emphasize that in the foreign trade policy there are not pure liberalism and pure protectionism. In the high economic growth there are tendency to liberalism in foreign trade policy and in the economic crisis there are tendency to protectionism. At the same time, it should be stressed that free trade in itself is not responsible for economic growth, but more significant are the determining macroeconomic stability and increasing investment.

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ASSET-LIABILITY MANAGEMENT MODELS IN DECISION MAKING

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A B S T R A C T

This paper uses an asset-liability management model to solve multi-period investment problems. The model aims to maximize the overall revenue and deal with uncertainties as well as with risks. The assumption of a linear utility function may lead to allocation of the wealth to one asset. This paper sheds some light on this issue by showing that the linear function can be a risky choice. For this purpose to solve multi-period investment problem we used two ways: first, using a piecewise linear function; and second using a non-linear utility function. The results show that the non-linear function outperform the piecewise linear function and generates better asset allocation. The problem is formulated by using the Wolfram Mathematical Programming System.

Keywords: Asset-liability management model (ALM), linear and nonlinear utility function, portfolio optimization and multi period asset allocation.

INTRODUCTION

The Asset-Liability Management (ALM) problem has crucial importance to pension funds, insurance companies and banks where business involves large amount of liquidity. Indeed, the financial institutions apply ALM to guarantee their liabilities while pursuing profit. The liabilities may take different forms: pensions paid to the members of the scheme in a pension fund, savers' deposits paid back in a bank, or benefits paid to insurers in the insurance company. A common feature of these problems is the uncertainty of liabilities and the resulting risk of underfunding. The other major uncertainty originates from asset returns. Together they constitute a nontrivial difficulty in how to manage risk in the model applied by the financial institution. The need for multi-period planning additionally complicates the problem.

Stochastic programming provides a general purpose-modeling framework, which captures the real-world features such as turnover constraints, transaction costs, risk aversion, limits on groups of assets and other consideration. However, the optimization model turns out to be intractable for the enormous number of

decision variables, especially for the multi-stage problems. One of the first industrially applied models of this type was the stochastic linear program with simple recourse developed by Kusy and Ziemba in 1986. This model captured certain characteristics of ALM problems: it maximized revenues for the bank in the objective under legal, policy, liquidity, cash flow and budget constraints to make sure that deposit liability is met as much as possible. Under computational limits at the time when it was developed, this model took the advantage of stochastic linear programming so as to be practical even for the large problems faced in banks.

In this paper we demonstrate how ALM model can be applied for asset allocation in financial markets. We assume a very simple model with tree "assets"; stock A and Stock B and bonds.

Moreover, it is important for decision makers to rebalance the portfolio during the investment period as they may wish to adjust the asset allocations according to updated information on the market. The strategy which is currently optimal may not be optimal any more as the situation changes. Thus, it is important to reconsider the strategy and make the necessary changes in order to remain in the optimal position. Taking this into account, the investor is allowed to rebalance annually using the new information at the

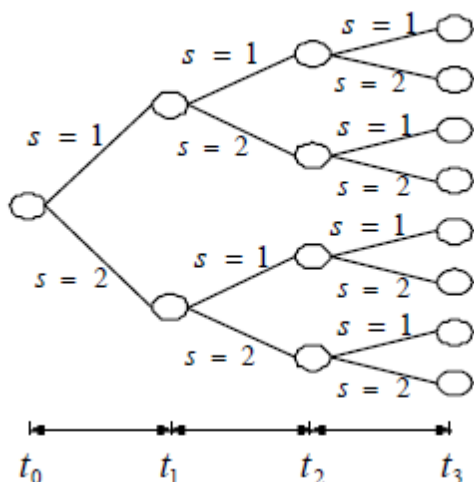* Corresponding Author:
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Figure 1: A scenario tree for a multi-stage stochastic program.

end of each period. In order to allow different decisions thought the investing process a multi-stage ALM model is used.

To make it easier to model, we consider the problem stage by stage and with portfolio rebalancing done at the beginning of each stage. Also, the uncertainties of asset returns are implemented with discrete distributions, in which case an event tree is used to capture the uncertainties in multiple stages throughout the whole decision process, e.g. as shown in Figure 1. The nodes at each stage represent possible future events. Asset returns, liabilities and cash deposits are subject to uncertain future evolution. Meanwhile, the asset rebalancing is done after knowing which values the asset returns and liabilities take at each node.

The paper is organized as follows: in Section 2 we provide a classification of the more recent life-cycle asset allocation models based on the type of available solutions. Section 3 describes the stochastic programming model, in particular the formulation of the objective, the optimization approach using piecewise linear utility function and nonlinear utility function, and the generation of scenarios. In Section 4, numerical results from the ALM model are compared and Section 5 concludes our study.

OVERVIEW OF ASSET ALLOCATION MODELS

The classical treatments of strategic asset allocation can be traced back to Samuelson (1969) and Merton (1969, 1971). In the light of Markowitz'(1952) paper on single-period portfolio selection, the early literature focused on conditions leading to the optimality of myopic policies, i.e., conditions under which portfolio decisions for multi-period problems coincide with those for single period problems. In addition, the lack of computing power leads to formulate models driven by the quest for closed form solutions. To achieve these objectives, rather restrictive assumptions were made, and many of these models' results turned out to be inconsistent with conventional wisdom as expressed by the so-called Samuelson puzzle: the optimal allocation does not depend on the investor's horizon and the investor with power utility who rebalances his portfolio optimally should choose the same asset allocation. This contradicts the advice obtained from many professionals in practice that investors should hold a share of risky assets because they look relatively less risky as they approach retirement (often called the age effect).

Since then, many researchers have tried to resolve this puzzle which is mainly rooted in some of the (simplifying) assumptions used in early models (fixed planning horizon, time-constant investment opportunities, no intermediate consumption, etc.).

Research in the area of life-cycle asset allocation models regained momentum in the early 1990s for two main reasons: first, a number of economic factors increased the number of people with sizeable wealth to invest (the "generation of heirs"), coupled with increased uncertainty about the security of public pension systems. Second, the enormous increase in computer power enabled the solution of models with more realistic assumptions. A number of additional features have been added to the classical models, in many cases with the goal of resolving the Samuelson puzzle: stochastic labor income, time-varying investment opportunities, parameter uncertainty (with and without learning), special treatment of certain asset classes (real estate), and habit formation, to name just the most important developments.

In contrast to other approaches in the literature using non-linear optimization (see, e.g., Blomvall and Lindberg 2002; Gondzio and Grothey 2007), we use multi-period stochastic linear programming (SLP) to solve the problem of optimal life-cycle asset allocation and consumption. This method has been explicitly chosen with the practical application of the approach in mind. Many features which are considered important for investment decisions in practice can be easily incorporated when using SLP. For example, personal characteristics of the investor can be taken into account (e.g., mortality risk, risk attitude, retirement, future cash flows for major purchases or associated with other

life events). Combined with the availability of efficient solvers, this explains why the SLP approach has been successfully applied to a wide range of problems (see, e.g., Wallace and Ziemba 2005). To nest classical analytical results from this area within our model, we maximize expected utility of consumption over the investor's lifetime and expected utility of bequest rather than other objectives which can be implemented more easily (e.g., piecewise linear or quadratic penalty functions, or minimizing CVaR).

An important reference for the present paper is Campbell et al. (2003). They model asset returns and state variables as a first-order vector autoregression VAR(1) and consider Epstein–Zin utility with an infinite planning horizon. Additional assumptions include the absence of borrowing and short-sale constraints. Linearizing the portfolio return, the budget constraint, and the Euler equation, they arrive at a system of linear-quadratic equations for portfolio weights and consumption as functions of state variables. This system of equations can be solved analytically, yielding solutions which are exact only for a special case (very short time intervals and elasticity of intertemporal substitution equal to one), and accurate approximations in its neighbourhood.

The SLP used in the present paper has been applied successfully to a number of related problems. To cite only a few examples, there are applications in insurance (Cariño and Ziemba 1994, 1998; Cariño et al. 1998), and the pension fund industry (e.g., Gondzio and Kouwenberg 2001). Zenios (1999) surveys large-scale applications of SLP to fixed income portfolio management. General aspects of applying such models in a strategic asset allocation context are discussed in Ziemba and Mulvey (1998), Pflug and Swietanowski (2000), Gondzio and Kouwenberg (2001), Wallace and Ziemba (2005), and Geyer and Ziemba (2007). Particular aspects that are relevant in a life-cycle portfolio context are discussed in Geyer et al. (2007).

A MULTISTAGE MODEL: ASSET- LIABILITY MANAGEMENT

The best way to introduce multistage stochastic model is a simple asset liability management (ALM) model (Birge and Louveaux 1967). We have an initial wealth W^0 that should be properly invested in a way to meet a liability L at the end of the planning horizon H.

If possible, we would like to own a terminal wealth W^H larger than L; however, we should account properly for risk aversion, since there could be some chance to end

up with a terminal wealth that is not sufficient to pay for the liability, in which case we will have to borrow some money.

A nonlinear, strictly concave utility function of the difference between the terminal wealth W_H, which is a random variable, and the liability L would do the job, and this would lead to a nonlinear programming model. In this paper we will present two alternatives of modelling the portfolio decisions for multi-period problems. As a first alternative, we can build a piecewise linear utility function like the one illustrated in Figure 2.
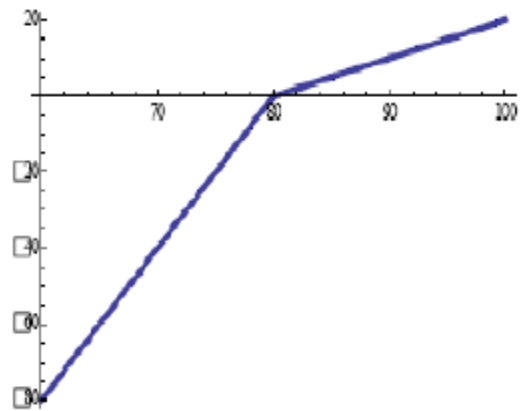
Figure 2: Piecewise Linear Utility Function.

And as a second alternative, we can build a nonlinear utility function like the one illustrated in Figure 3.

The utility is zero when the terminal wealth WH matches the liability L exactly. If the slope r penalizing the shortfall is larger than reward rate (q), this function is concave (but not strictly). The portfolio consists of a set of 3 assets. For simplicity, we assume that we may rebalance it only at a discrete set of time instants t = 1, ... , H-1, with no ransaction cost; the initial portfolio is chosen at time t = 0, and the liability must be paid at Time H.
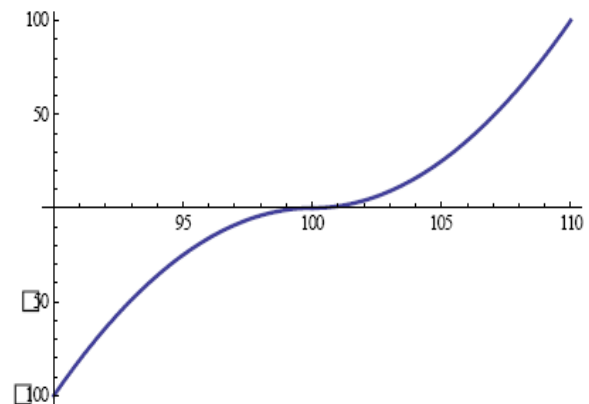
Figure.3 The Nonlinear Utility Function.

Time period t is the period between time instants t - 1 and t. In order to represent uncertainty, we may build a tree like that in Fig. 4. , which is a generalization of the two-stage tree. Each node nk in the tree corresponds to an event, where we should make some decision. We have an initial node n0 corresponding to time t = 0.
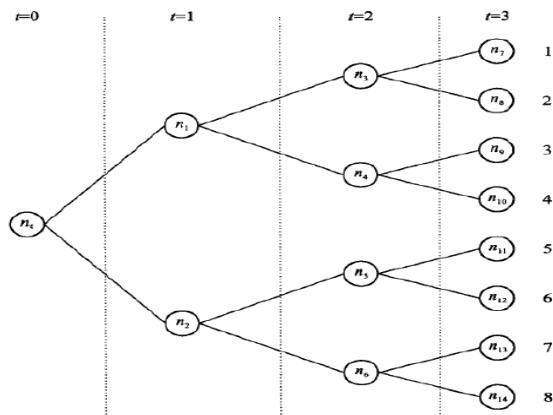
Figure 4. Scenario tree for a simple asset- liability management problem.

Then, for each event node, we have two branches; each branch is labelled by a conditional probability of occurrence, P(nk|ni), where ni = a(nk) is the immediate predecessor of node nk. Here, we have two nodes at time t = 1 and four at time t = 2, where we may rebalance our portfolio on the basis of the previous asset returns.

Finally, in the eight nodes corresponding to t = 3, the leaves of the tree, we just compare the terminal wealth with the liability and evaluate the utility function. Each node of the tree is associated with the set of asset returns during the corresponding time period. A scenario consists of an event sequence, i.e., a sequence of nodes in the tree, along with the associated asset returns. We have 8 scenarios in Fig. 4. For instance, scenario 2 consists of the node sequence (n0, nl, n3, n8). The probability of each scenario depends on the conditional probability of each node on its path. If each branch at each node is equally probable, i.e., the conditional probabilities are always 1/2, each scenario in the figure has probability $p_s = 1/8$, for s = 1, ...,8. The branching factor may be arbitrary in principle; the more branches we use, the better our ability to model uncertainty; unfortunately, the number of nodes grows exponentially with the number of stages, as well as the computational effort.

At each node in the tree, we must make a set of decisions. In practice, we are interested in the decisions that must be implemented here and now, i.e., those

corresponding to the first node of the tree; the other (recourse) decision variables are instrumental to the aim of devising a robust plan, but they are not implemented in practice, as the multistage model is solved on a rolling-horizon basis. This suggests that, in order to model the uncertainty as accurately as possible with a limited computational effort, a possible idea is to branch many paths from the initial node, and less from the subsequent nodes. Each decision at each stage may depend on the information gathered so far, but not on the future; this requirement is called a non-anticipatively condition. Essentially, this means that decisions made at time t must be the same for scenarios that cannot be distinguished at time t.

To build a model ensuring that the decision process makes sense, we can associate decision variables with nodes in the scenario trees and write the model in a way that relates each node to its predecessors.

Let us now introduce the following numerical data:

• The initial wealth is $W^o = 50$.

• The target liability is $L^s 100$.

• There are three assets, say, stocks A and B, and bonds; hence, I = 3.

• In the scenario tree of Fig. 4. we have up- and down-branches; in the (lucky) up-branches, total return is 1.28 for stock A, 1.40 for stock B and 1.20 for bonds; in the (bad) down-branches, total return is 1.08 for stock A, 0.99 for stock B and 1.12 for bonds. We see that bonds play the role of safer assets, and stocks B are very risky assets here. According to Barberies (2000), when asset returns are modelled as i.i.d. the mean and variance of cumulative log returns grow linearly with the investor's horizon.

• The reward rate q for excess wealth above the target liability is 1.

• The penalty rate r for the shortfall below the target liability is 4.

Let us introduce the following notation:

• N is the set of event nodes; in our case N = {n0, n1, n2, ..., n14}

• Each node n ∈ N, apart from the root node n0, has a unique direct predecessor node, denoted by a(n): for instance, a(n3) = n

• There is a set S ∩N of leaf (terminal) nodes; in our case S = {n7, ..., n14}

• For each node s ∈ S we have surplus and shortfall variables ws+ and ws_, related to the difference between terminal wealth and liability.

• There is a set T ∩ N of intermediate nodes, where portfolio rebalancing may occur after the initial allocation in node no; in our case

T = {n1, n2, ..., n6}

• For each node n Є{n0} U T there is a decision variable x_{in}, expressing the money invested in asset i at node n. With this notation, the model may be written as follows:

$$\max \sum_{s \in S} (\pi^s)(qw_+^s - rw_-^s) \text{------------------------------(1)}$$

such that: $\sum_{t=1}^{I} x_0^{no} = W^0 \text{------------------------------(2)}$

$$\sum_{t=1}^{I} R_t^n x_t^{a(n)} = \sum_{t=1}^{I} x_{t'}^n, \quad \forall n \in \tau \text{----------------------(3)}$$

$$\sum_{t=1}^{I} R_t^s x_t^{a(s)} = L^s + w_+^s - w_-^s, \forall s \in S \text{----------------(4)}$$

$$x_t^n, w_+^s, w_-^s \geq 0 \text{--(5)}$$

where R_i^n is the total return for asset i during the period that leads to node n, and π^s is the probability of reaching the terminal node s Є S; this probability is the product of all the conditional probabilities on the path that leads from root node no to leaf node s.

NUMERICAL RESULTS

a. Piecewise Linear Utility Function: Recall that when asset returns are modelled as i.i.d., the mean and variance of cumulative log returns grow linearly with the investor's horizon (Barberies,2000). This leads an investor who rebalances his portfolio to choose the same asset allocation (see Table 1). These results suggest that analyses of dynamic strategies in which the uncertainty in not accurately represented should be interpreted with some caution. A possible solution is to branch many paths from the initial node, and less from the subsequent nodes or a more accurate representation of utility with more linear pieces.

Table 1. Investment strategy for a simple ALM problem with piecewise utility function.

Node	Stock A	Stock B	Bonds
n0	16.89	33.12	0
n1	67.97	0	0
n2	0	51.02	0
n3	0	0	87.01
n4	23.12	50.29	0
n5	0	71.43	0
n6	0	50.51	0

The Nonlinear Utility Functions

When we are approximating a nonlinear utility function by a piecewise linear function, the portfolio is not diversified and the wealth in the last time period is allocated to one asset (see Table 1). Actually, this alternative may imply "local" risk neutrality, so that we only care about expected return.

The uncertainty about the parameters may change over time. Therefore, the investment opportunity set perceived by the investor may change over time. To study the importance of uncertainty in a dynamic context we use the nonlinear programming model. As a result, the investor's are suggested to allocate their wealth in all assets (see Table 2). Using nonlinear utility function the objective of the optimization problem becomes:

$$\max \sum_{s \in S} (\pi^s)\{(w_+^s)^2 - (w_-^s)^2 \text{--------------------------(6)}$$

Table 2. Investment strategy for a simple ALM problem with nonlinear utility function

Node	Stock A	Stock B	Bonds
n0	0	50	0
n1	0	70	0
n2	21.96	11.70	15.84
n3	0	98	0
n4	39.52	0	29.78
n5	35.37	4.48	23.65
n6	23.53	21.15	8.36

CONCLUSION

In the paper special emphasis was put on the shape of the investors' payoff functions in asset price equilibrium. The assumption of a linear utility function may imply "local" risk neutrality, so that we only care about expected return, resulting allocation of the wealth to one asset. When the asset returns are models as i.i.d. with piecewise utility function, then regardless of investment horizon an investor who rebalances his portfolio is suggested to choose the same asset allocation. On the other hand, when the nonlinear utility function is used the investor's are suggested to allocate their wealth in all assets. The results presented here suggest that portfolio calculations can be seriously misleading if the allocation framework ignores the fact that the uncertainty in not accurately represented.

In our paper we have assumed that the liabilities must be met, and this is a very hard constraint. If extreme scenarios are included in the formulation, it may well be the case that the model above is infeasible. Therefore, the formulation should be relaxed in a sensible way; we could consider the possibility of borrowing cash; we could also introduce suitable penalties for not meeting the liabilities. In principle, we could also require that the probability of not meeting the liabilities is small enough; this leads to chance-

constrained formulations, for which we refer the reader to the literature (Campbell JY, Viceira LM 2002, Heitsch H, Römisch W 2003, Hochreiter R, Pflug GC 2007, Klaassen P 2002, Liu J 2007, Wallace SW, Ziemba WT (eds) 2005).

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THE REPERCUSSIONS OF THE 2008 FINANCIAL CRISIS ON THE LABOUR MARKET IN TUNISIA

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A B S T R A C T

This paper aims at studying macro aspect of the virulent impact of the 2008 financial crisis on the Tunisian economy during the 1970 – 2010 period using the Autoregressive Distributed Lag (ARDL). Our results prove that the crisis has a significant and negative effect on the real GDP per capita. They also show that the labour market was affected through two different transmission channels namely: the exports and the Foreign Direct Investments (FDI). We discovered that the FDI had a long run significant and positive impact on the real GDP per capita but at a weak coefficient. Similarly, we found that there was a bidirectional relationship between the real GDP per capita on the one hand, and the exports, the FDI and the unemployment rate respectively, on the other, which promoted the spread of the crisis in Tunisia.

Keywords: Global financial crisis, economic growth, labour market, ARDL, Tunisia.

INTRODUCTION

The financial and economic crisis of 2008 and 2009 has taken its toll on the world economy. It has caused the world economy to plunge in the most profound recession since World War II (FMI, 2009). After a period of relative growth from 2003 to 2007, the world economy plunged in a deep recession in 2008 and declined sharply in 2009. Consequently, the developing countries have witnessed important economic difficulties. The decline in production was accompanied by a drop in the employment growth and an increase in the unemployment rate.

Because of their high degree of openness and commercial integration with the developed countries, the contagion has quickly affected the developing countries (Downes, 2009).

The effect of the financial crisis spread through two different transmission channels: the commercial flows and the capital flows. The main effects in the developing countries manifested through the decline of the exports of goods and services, of the foreign direct investment and the limited access to the international

credit and remittances (Allen & Giovannetti, 2011). This type of exterior effects could affect the fiscal accounts, the labour market, poverty and other macroeconomic and socio economic variables.

The Tunisian commercial openness has led to a recession that has deeply influenced the general volume of its commerce. According to the International Monetary Fund (IMF) report 2010 "at the end of 2008 and beginning of 2009 there was a sharp decline in the exports of industrialised goods. This is due to the current economic recession in the European Union. The main result was the drop of the industrial production and the decline of the real GDP growth from about 4.6% in 2008 to 1.3% in the first trimester of 2009". The Tunisian economy depended heavily on the EU particularly the exports, tourism revenues, the remittances and the FDI. More than the three quarters – about 90% - of the total revenues of Tunisia came from the EU in 2008.

Therefore, Tunisia depends potentially on fluctuations in EU growth. The exports of goods represent 47% of its GDP among which 76% were exports towards the EU. The main important partners of Tunisia in its exports and imports dealings are the EU, Libya and

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China. Thus, Tunisia's annual growth rate appears to have become increasingly synchronized over time with the annual growth rate of its main European trading partners.

Tunisia's labour market, consequently, was affected by the 2008 financial crisis and subsequent turbulence in Tunisia's main export-import dealing nations. In fact, employment has dwindled down at a faster pace than output. That is why overcoming the crisis calls for measures and policies aimed at creating new jobs and taking into account the needs of the future labour market.

It is obvious, then, that there is a strong relationship between the world economy and the Tunisian one, on the one hand, and a tight relationship between the financial system and the economic growth, on the other. Despite its weak financial system, Tunisia was urged to undertake different measures aiming at reorganizing the functioning of the financial sphere: lowering the interest rate, massive refinancing of banks, revising bank regulations etc. The objective is, then, to avoid the discordances of the financial system, which might hamper the economic growth and cause unemployment to go up.

The novelty of this paper lies in its examination of the impact of the global financial crisis on the already strained labour market (Dammak & Boujelbène, 2009). It explores the government policy in response to the crisis in the areas of employment creation, labour market services, and vocational education training. We applied the "Autoregressive Distributed Lag (ARDL)", an econometric technique suggested by Pesaran et al. 2001, in order to establish the long run relationship between the variables under study.

The remaining of this paper is organised as follows: in section 2, we analysed the impact of the 2008 financial crisis on the Tunisian economy through several transmission channels. In section 3, we tried to examine empirically the real effect of this crisis not only on the economic growth but also on the labour market in Tunisia during the 1970 - 2010 period through two transmission channels: the exports and the foreign direct investment. Lastly, we concluded this study with an extensive discussion of the most important empirical results.

THE IMPACTS OF THE 2008 FINANCIAL CRISIS VIA POSSIBLE TRANSMISSION CHANNELS

Most of the Tunisian population relies heavily on the labour market as an important source of income. Since this market is determined by profit, production level and demand for national and international goods and services, any chock on the products market - such as reduction of the exports level of goods and services and the decline of FDI's among others – would affect directly and indirectly the labour market. The Tunisian economy is sensitive to external economic chocks as it relies to a great extent on the economies of the EU countries whether for its exports of goods and services or the Foreign Direct Investments.

The direct effects of the new financial crisis on the economic growth are not so significant. This can be attributed to the diverse measures undertaken by the Tunisian government to reorganise the financial sphere functioning in spite of the weak financial market which is still emerging, narrow and offering limited services at more expensive informational and transactional costs than those of developed markets (Rejichi &Aloui, 2012). The objective of these measures is to avoid the financial system discordances which could hamper the economic growth. The external financing share in Tunisia, bond emission, securities issue and private loans seem to be very weak compared with other emerging countries. The banking system has very limited links with the international market and its activities are mainly financed by the domestic deposits representing 80% of the banks' resources.

Therefore, Tunisia was away from the direct impact of the 2007 subprime crisis and the banking crisis of the summer of 2008, which allowed Tunisia to avoid the devastating effects of a systematic financial crisis which shook violently the international financial markets.

However, all the economic indicators reflect a large scale deterioration of the economic activities and the awful situation of the labour market. The most significant impact of this financial and banking crisis seems to be through the real sector by the decline of the demand for the exports of goods and services and the drop of the FDI's. The real GDP growth rate went down from 6.3 to 3.0% during the 2007 – 2009 period, Perspectives Economiques en Afrique (2011). The unemployment rate grew from 14.1 to 14.7% during the same period.

a-The effects on the financial market: The financial crisis has altered the growth margin applied to loans on the international financial markets throughout the world, mainly in the emerging countries and Africa. In the case of Tunisia, these margins have grown swiftly by more than 200 basis points during the most difficult

periods of bank bankruptcies in the USA. Thus, Tunisia decided to postpone the resort to the international financial markets and turned to the local market to mobilise the necessary resources to finance its economic growth. The crisis affected the country's international financing means from 2007 onward. For instance, Tunisia's attempt to get funds from the Japanese financial market was faced with more stringent financial requirements. Therefore, facing a credit margin estimated between 45 and 50 basic points, Tunisia had to abandon 25 basic points to be able to mobilise some resources.

b-The impact of the commercial openness on the economic growth: The economic openness and the commercial integration established between developed and developing countries have played an important role in the spread of the financial crisis. However, the speed of this spread was determined with the degree of integration among countries. Therefore, the new recession of the global economy affected differently the developed countries and had rather adverse significant effects on the developing ones (Pham, 2010).

As far the international commerce is concerned, the 2008 financial crisis resulted in a decline of the volume of importations.

In Tunisia, there has been a drastic decline of the importations from 23637 (million dinars) in 2008 to only 19469.2 (million dinars) in 2009. These losses in the exports growth rates were not compensated by a reduction in the value of imports growth rates. Thus, Tunisia has not derogated to the pessimistic perspective towards the world trade in 2009 which was reflected by the poor perspectives of economic growth of the industrialised and emerging countries resulting in a weak world demand. The exports growth rate dropped by 7% whereas the imports growth rate lost only 4.7%. Certainly this economic and financial crisis affected badly the European textile – clothing consumption causing the Tunisian exports in these sectors to drop by 19% in November 2009 compared with november 2008. There has also been a world regression in demand of petrolium exports as well as phosphate and its derivatives on the international market. Furthermore, the decline of car sales in Europe caused the off-shore exports of mechanical and electric industries to drop. In 2009, the goods and services exports dropped in comparison with 2008 leading to a degradation of the commercial balance.

c-The impact on the Foreign Direct Investments: The recession caused by the financial disruption is obvious in Tunisia by the flow of funds through the Foreign Direct Investment (FDI). This transmission channel of the 2008 financial crisis has a negative effect on the real sector. Globally, the FDI is a world tendency that dwindled by about 21% in 2008 and risked to worsen in 2009. This was clear in Tunisia when the FDI which represents a strong economic growth drive fell noticeably (Bashir, 1999). The net income of the FDI divided by GDP went down from 6.459 in 2008 to 4.032 in 2009.

This decline in the FDI accompanied by the exports decrease led to the degradation of the economic growth in Tunisia**.** The GDP growth rate per capita has also dropped from 5.32% to 2.09% over the period 2007 - 2009. The most affected sectors by this financial and economic crisis are those of textiles and manufactures. Shutting down enterprises and project postponing or cancellation has become more and more frequent in Tunisia. Substantial job losses have also been recorded with direct negative effects on the household standard of living. As a consequence the world growth slowdown has affected the Tunisian efforts to achieve its millennium objectives for an economic growth and a reduction of unemployment.

EMPIRICAL STUDY OF THE IMPACT OF THE FINANCIAL CRISIS ON THE LABOUR MARKET

Before investigating empirically this impact, we would present our model. Then we would show our methodology and empirical results

a- The model general framework: In this study, we examined the potential impact of the new financial crisis on the economic growth through two different transmission channels: The exports and the FDI's. These channels make up two important drives for the development process in the developing countries in general and particularly in Tunisia (Naudé, 2009, Phu Huynh et al., 2010). It is acknowledged that any financial or economic shock might have a negative impact on the economic growth. However, according to Okun law, there is a negative macroeconomic relationship between production and unemployment. Nevertheless, any decrease in the production volume would be translated by a decrease in employment and an increase in unemployment. This relation was checked by several economists such as Smith (1975), Gordon (1984), Kaufman (1988), weber (1995), Lee (2000), Calmfors & Holmlund (2000), Moosa (2008),

Tingi & Ling (2011) and cazes, Verick & Al Hussami (2011). Their studies have resulted in an empirical validation of the relationship but with a substantial variation of the estimated coefficients through countries and time.

The economic theory and the empirical studies developed various arguments justifying the relationship between FDI, exportation and unemployment on the one hand and growth on the other. This generated a multitude of causal, probably reciprocal, relationships. Obviously, there are many variables that were used to explain a short and long run economic growth. This has made the choice of the variables to determine the contagious effect of the 2008 financial crisis on the economic growth and the labour market in Tunisia stringent. We used annual data covering the 1970 - 2010 period to carry out our empirical study about the real indirect impact of this crisis on the economic growth and the labour market in Tunisia through the above mentioned two transmission channels. The variables are identified as follows:

- GDP_t : gross domestic product per capita to reflect the economic growth
- X_t : exportation per capita
- FDI_t : foreign direct investment per capita
- U_t : total unemployment rate

The data relative to the exports, FDI's and GDP were collected from the Tunisian Central Bank. All these variables are expressed in millions of Tunisian Dinars. As for the total unemployment rate and the total population data, we used the statistics of the National Institute of Competitiveness and Quantitative Studies (l'Institut National de la Competitive et des Etudes Quantitative (INCEQ)).

The Real Effective Exchange Rate (REER), collected from the International Monetary Fund (IMF), was integrated in our model as a control variable. It was used at constant price of 2000. It added as a control variable since it plays a potential influential role in the economic growth through its regulatory effect of economic shocks. Moreover it has also an important role that influences the determinants of the economic growth such as the exports, the imports and the FDI.

All the variables used in our model are expressed in logarithm to be able to include the multiple effects of the time series. They are also adjusted by the GDP deflator to eliminate the influence of inflation. In addition, a dummy variable noted as DU-crisis that takes the value of 1 from 2009 and 0 in all other periods to account for the appearance of the effect of the new financial crisis on the real GDP per capita over the studied period. Thus our model is written as follows:

$$ln(GDP)_t = \alpha + \beta\, ln(X)_t + \gamma\, ln(FDI)_t + \delta\, ln(U)_t + \varphi\, ln(REER)_t + \mu\, DU - crisis + \varepsilon_t \quad (1)$$

With ε_t is an error term of null mean and a constant variance.

The parameters of the model measure the sensitivity of the variables relative to the economic growth. Typically, the expected signs of the set of the coefficients of the model (1) variables are:

$$\beta, \gamma, \varphi > 0 \; et \; \delta, \mu < 0.$$

b- The econometric methodology: We estimate our model using a cointegration technique proposed by Pesaran et al. (2001), known as the Autoregressive Distributed Lag (ARDL) to be able to overcome the limitations of the conventional cointegration methods (Engle & Granger, 1987 and Johansen, 1991). These methods require the determination of the integration degree of the used variables and that the variables are integrated of the same order. This would lead inevitably to a stationarity pre-test of the variables. The most important advantage of the ARDL, however, is its ability to be applied to any degree of integration of the used variables: purely I(0), purely I(1) or a mixed degree of integration. The other advantage is that it has superior statistical properties with small samples (Cheung Lai, 1990). In fact, this method is relatively more efficient with small samples as it is the case for most of the empirical studies in the developing countries.

This study is designed to examine the possibility of a long run relationship between the real gross domestic product per capita which reflects the economic growth noted by real GDP per capita and the transmission channels (exports per capita and the foreign direct investment per capita noted by *X* and *FDI* respectively). We also added a total unemployment rate noted by *(U)* and a control variable: the Real Effective Exchange Rate noted by (REER) for the reasons in 3.a (The model general framework). To this end, we used the cointegration method suggested by Pesaran et al. (2001).

We would start by providing a brief description of the ARDL technique. This procedure classifies all the model variables as endogenous variables. The error correction model is expressed through the following equation:

$\Delta Ln(GDP)_t =$

$a_0 + \sum_{i=1}^{p} b_i \Delta Ln(GDP)_{t-i} + \sum_{i=0}^{p} c_i \Delta Ln(X)_{t-i} +$

$\sum_{i=0}^{p} d_i \Delta Ln(FDI)_{t-i} +$

$\sum_{i=0}^{p} e_i \Delta Ln(U)_{t-i} + \sum_{i=0}^{p} f_i \Delta(REER)_{t-i} + \delta_1 LnGDP_{t-1} +$

$\delta_2 Ln(X)_{t-1} + \delta_3 Ln(FDI)_{t-1} + \delta_4 Ln(U)_{t-1} +$

$\delta_5 Ln(REER)_{t-1} + \delta_6 DU - crisis + \varepsilon_t$ (2)

With Δ representing the first difference operator, a_0 is the drift component, and ε_t is a null mean term with a constant variance, and the variables $Ln(GDP)$, $Ln(X)$, $Ln(FDI)$, $Ln(U)$ et $Ln(REER)$ which were defined above in this paper.

We started by the estimation of equation (2) by the Ordinary Least Square method in order to test the presence of a long run relationship between the variables through the value of the Ficher test to determine the significance of the number of lags of the variables of our model. We tested $H_N: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ against $H_A: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$ hypothesis. We indicated the standardized test by the GDP by $H_A: \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$. We jointly calculated the statistics of Ficher where the other variables of model (2) were used as dependent variables and noted by $F_X(X|GDP, FDI, U, REER)$, $F_{FDI}(FDI|GDP, X, U, REER)$, $F_U(U|GDP, X, FDI, REER)$ and $F_{REER}(REER|GDP, X, FDI, U)$.

The null hypothesis of the absence of a cointegration relation between the variables of our model could be rejected without taking into account the integration order of the time series if the computed F- statistic was higher than the upper bound of the critical values. However, if the computed F- statistic was lowered to the bound, the information about the integrated variables order is necessary to make a decision about the long run relationships.

c- Empirical results: First, the tests on the effects of the transmission channels on the economic growth in Tunisia were conducted. The presence of a long run relationship between the retained variables was tested. Our results show the existence of a long run relationship between ln(GDP), $Ln(X)$, $Ln(FDI)$, and $Ln(REER)$. Our model (2) was estimated using the Ordinary Least Square (OLS) method to determine the number of delays (p) by the Schwartz–Bayesian Criterion (SBC). The null hypothesis $H_0: \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ was totally rejected and a serious correlation was achieved with a number of delays (p=4) as suggested by (SBC). The computed F- statistic $F_{GDP}(GDP|X, FDI, U, REER) = 4.9662$ was higher than upper bound of the critical value obtained from Narayan at 5%. These results suggest the evidence of the existence of a cointegration relation between the economic growth and the transmission channels, the unemployment rate and the real effective exchange rate in Tunisia during the period under study. This process was conducted with the other variables of our model $(X, FDI, U, REER)$. We also showed that the computed F- statistic was superior to the upper bound critical value of Narayan at 1%, 5% or 10%. Table 1 reports this as well as the results of the other models. From this table, we can conclude that there is a causality relationship between the variables of the model at a 5% significance level except for the real effective exchange rate.

Table 1: The bounds test for the existence of a level relationship

Model	Computed F Statistic	Lag	Significance Level	Critical bound* F-Statistic	
				I(0)	I(1)
$F_{GDP}(GDP|X, FDI, U, REER)$	4.966[a]	4	1%	5.376	7.092
$F_X(X|GDP, FDI, U, REER)$	5.101[a]	3	5%	3.958	5.226
$F_{FDI}(FDI|X, GDP, U, REER)$	3.954[a]	3	10%	3.334	4.438
$F_U(U|X, FDI, GDP, REER)$	6.834[a]	3	-	-	-
$F_{REER}(REER|X, FDI, U, GDP)$	2.649[b]	3	-	-	-

Notes: the period of estimation: 1975-2010. Letter a indicates that the statistic is above the superior threshold and the letter b indicates that the value is below the inferior threshold. Source of the critical values: Narayan (2005).

* According to Narayan (2005), the existing critical values indicated in Pesaran et al. (2001) cannot be used for small sample sizes. Narayan (2005) provides a set of critical values for sample sizes ranging from 30 to 80 observations. In this study, we compare the calculated F- statistics with the critical values from Narayan (2005). For more details, see Narayan (2005).

However, only one cointegration relation was deduced: ARDL (p, q1, q2, q3, q4).

$$Ln(GDP)_t =$$
$$\gamma_0 + \sum_{i=0}^{p} \gamma_1 Ln(GDP)_{t-i} + \sum_{i=0}^{q1} \gamma_2 Ln(X)_{t-i} + \sum_{i=0}^{q2} \gamma_3 Ln(FDI)_{t-i} + \sum_{i=0}^{q3} \gamma_4 Ln(U)_{t-i} + \sum_{i=0}^{q4} \gamma_5 Ln(REER)_{t-i} + \gamma_6 DU - crisis + \varepsilon_t$$

Using the Pesaran et al. approach (2001), we obtained the level of the parameters of the long run estimations of our model. The ARDL model (4, 1, 1, 4, 0) was chosen

The long run model with the dummy variable for Ln(GDP)t can be estimated as:

according to the SBC criterion. The long run estimation results indicated in table 2 show that the coefficients are statistically significant at a 5% level except for the

Table 2: Estimated long run coefficients using ARDL model with a dummy variable tendency.

Equation (3): ARDL (4, 1, 1, 4, 0) selected by SBC. Dependent Variable is Ln(GDP)

Regression	Coefficient	Standard Error	t-ratio	t-probability
C	2.353	0.356	6.595	0.000
$Ln(X)$	-0.598	0.298	-2.006	0.063
$Ln(FDI)$	0.100	0.044	2.265	0.038
$Ln(U)$	-0.700	0.117	-5.946	0.000
$Ln(REER)$	1.009	0.173	5.808	0.000
DU-crisis	-0.208	0.015	-13.832	0.000

Table 3: Error correction representation for the selected ARDL model.

Equation (3): ARDL (4, 1, 1, 4, 0) selected by SBC. Dependent Variable is ΔLn(GDP)

Regression	Coefficient	Standard Error	t-ratio	t-probability
C	0.028	0.009	2.817	0.011
$\Delta Ln(GDP)_{t-1}$	-0.022	0.155	-0.147	0.884
$\Delta Ln(GDP)_{t-2}$	-0.040	0.132	-0.308	0.761
$\Delta Ln(GDP)_{t-3}$	0.020	0.116	0.180	0.858
$\Delta Ln(GDP)_{t-4}$	-0.003	0.069	-0.049	0.961
$\Delta Ln(X)_{t}$	0.105	0.049	2.113	0.048
$\Delta Ln(X)_{t-1}$	-0.112	0.040	-2.793	0.012
$\Delta Ln(FDI)_{t}$	0.019	0.009	2.095	0.050
$\Delta Ln(FDI)_{t-1}$	-0.005	0.007	-0.687	0.500
$\Delta Ln(U)_{t}$	0.216	0.252	0.856	0.402
$\Delta Ln(U)_{t-1}$	0.064	0.269	0.239	0.813
$\Delta Ln(U)_{t-2}$	0.193	0.259	0.745	0.465
$\Delta Ln(U)_{t-3}$	-0.119	0.242	-0.490	0.629
$\Delta Ln(U)_{t-4}$	-0.222	0.347	-0.641	0.529
$\Delta Ln(REER)_{t}$	-0.289	0.101	-2.858	0.010
ecm$_{t-1}$	-1.325	0.382	-3.464	0.002
$\Delta DU - crisis$	0.084	0.031	2.639	0.016
R^2=0.69	DW=2.20			

exports coefficient which is statistically significant at a 10% level. The theoretically expected signs are checked except for the exports.

The short run coefficient estimations are shown in table 3. The equilibrium correction coefficient indicates the adjustment speed of the equilibrium repair in a dynamic model. The significant and negative sign of the error term prove the existence of a long term stable relationship.

Our main objective in this study was to answer the question whether the 2008 financial crisis has influenced the economic growth and the labour market in Tunisia? As discussed in section 2, this financial crisis has affected the Tunisian economy through many transmission channels and the most important, according to the empirical results, is the Foreign Direct Investment. Our results show that the FDI's are statistically significant for the economic growth at long run in Tunisia but with a weak coefficient. At short run, however, they are meaningless. This explains, to a large extent, that the liberalisation of the private capital investment did not really boost the economy in Tunisia. They had just a limited impact on the creation of skilled job positions. This is in total agreement with Vitullo (2008), and Harrison & Rodriguez-Clare (2009) who suggested that the sectors the foreign investors exploited are generally intense in labour but poor in highly developed technology. Bouoiyour (2010) also shows that "the liberalisation did not have any prospective effect in terms of employment and salaries but has enhanced Tunisia's specialisation in products that are intensive in low-qualified, good bargain labour but with a poor technological content".

On the other hand, these results could be also explained by the fact that the Tunisian educational system is not that initiator to private investment (whether domestic or foreign). It surely produces a qualified workers but that lacks integration in the economic circuit. The investors are looking for a low-qualified but cheap labour. This can be attributed to the fact that sectors with a high added value and that requires a qualified labour are not relatively developed in Tunisia.

As for the second transmission channel, our results show that the exports present a significant coefficient for a long run growth although it is negative. This negative significant sign allows us to deduce that the exports are less efficient to stimulate growth in a regime of protection. Nevertheless, the financial crisis

has a negative impact on the exports growth and thus on the revenues linked to exports (table 2). Our results are similar to those reached by Luis Carlos and Osvaldo (2009) for the case of the Bolivian economy. Concerning the coefficient of the control variable (the real effective exchange rate), however, our empirical results prove that it is positive and statistically significant (table 2). This indicates that the exchange rate policy could affect the economic growth directly or indirectly through the transmission channels (exports and FDI).

Also, according to our results, the estimated long run coefficient of the dummy variable is negative and statistically significant even though it was weak (table 2). This implies that the financial crisis has negatively and deeply affected the economic growth.

Just like several other empirical studies such as those of Tingi & Ling (2008), Nambiar (2009), Hoeven (2010), Balboa & Mantaring (2011), Kroeger & Meier (2011), Cazes et al. (2011) and Blunch & Sulla (2011), our empirical results show that the relationship between the real GDP per capita and the long run unemployment rate is negative and statistically significant. In addition, the crisis would negatively affect the labour market later. In other words, the global contagious effect of this crisis affects both the economic growth and the labour market. Similarly, Ionela (2009) shows that the commercial openness has a transmission effect of the economic and financial crisis from one country to another. He also stated that the labour market is affected by the crisis and that the unemployment increase is due to the decrease of the volume of several activities. Moreover, Cornilleau & Heyer (2010), proved that the crisis had negative consequences on the labour market of seven countries (France, Germany, Italy, Spain, UK, USA and Japan) and that the unemployment growth conceals the relative decline of production. Thus, our study testifies that the real effects of the crisis hit not only the developed countries but also the developing ones: Tunisia. Eventually, this study investigated the bidirectional causal relationship between the model variables except for the real effective exchange rate. This kind of relationship could engender more fragility of the economy in Tunisia and enhance the spread of the impact of the current financial crisis on the economic growth. Afterwards, we evaluated the stability of the long run relationship between the real GDP per capita, the transmission

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channels, the unemployment rate and the control variable. We relied on the "CUSUM" and "CUSUM-squared" tests to evaluate the constancy of the long run parameters. Figures 1 and 2 show clearly the stability of the coefficients during the estimation period.

Plot of cumulative sum of recursive residuals of resids ARDL_ECM
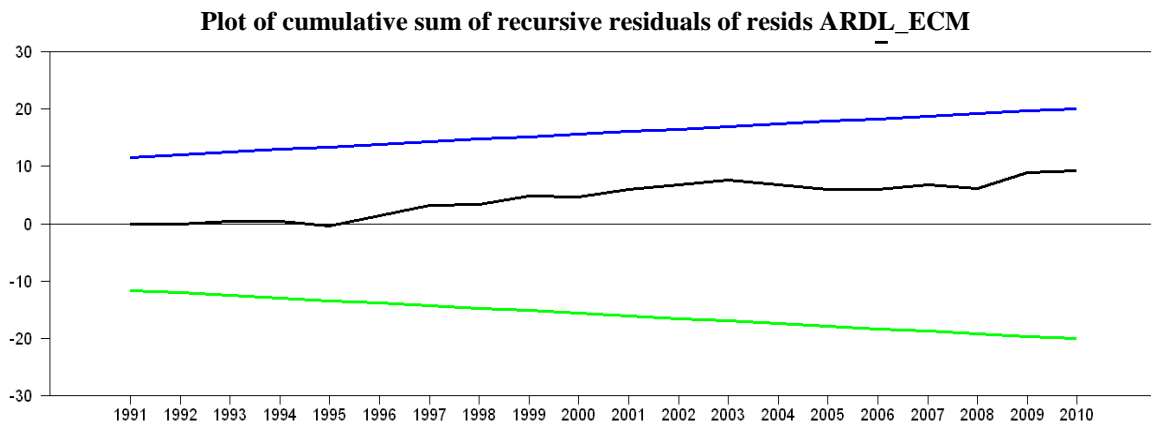
Figure 1: "Plot of CUSUM"
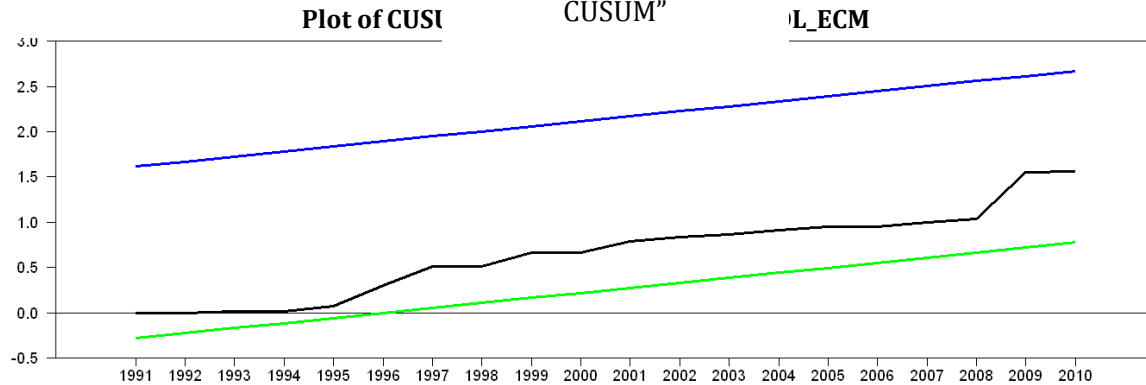
Plot of CUS ... L_ECM

Figure 2: "Plot of CUSUM SQ"

CONCLUSION

The goal of this paper was to estimate the impact of the subprime crisis on the Tunisian economy. To this end, a linear growth regression was run using the Autoregressive Distributed Lag (ARDL) approach for the 1970-2010 period. As for the relationship between the variables of our model, the empirical results showed that their long run stability proved the existence of a bilateral relationship between them except for the real effective exchange rate. According to our descriptive analysis, we have remarked that during the post crisis years there has been a decrease of the exports volume and the FDI's, as well. This causes an immediate negative impact on the economic growth and consequently on the labour market. On the other hand, our empirical results proved that the global financial crisis affected the Tunisian economic growth through two transmission channels causing unemployment to soar.

Our findings also showed that the FDI is the most important long run growth source in Tunisia. However, this variable might become the main cause of the spread of the current crisis in this country.

Relying on this study, we can deduce that Tunisia is required to take immediate financial and political measures at the short run to minimise the impact of the current financial crisis. Thus, promoting the high tech foreign investments to reduce unemployment rate higher for lower-skilled workers and enhance the internal investment. These two types of investment should be Complementary for both the economic growth and the development of the labour market.

Nevertheless, whether the financial openness and the financial growth are the ideal way to promote exportation and whether the FDI's and their impact on the economic growth and the labour market in developing countries in general and in Tunisia in particular could be the topic of future research studies.

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AN EXAMINATION OF THE NASDAQ 100 FUTURES CONTRACT USING ULTRA HIGH FREQUENCY DATA

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A B S T R A C T

This paper conducts a study on a high frequency data of futures index contracts after the examination of the Nasdaq 100 to investigate the effects of price duration in trading process. To achieve this prospect, we extend the Engle and Russell (1998) model, which divides the intensity effect into liquidity and information components by including additional microstructural variables. Examining tick by tick data of Nasdaq 100 futures index futures; we find that the time duration between transactions exerts a considerable influence on price changes. Additionally, the time can be modelled in combination with variable microstructure. This evidence suggests that managing both time, trading volume and microstructural variables are important aspects of trading in the index futures markets.

Keywords: Index futures contracts, market microstructure, price impact, ultra-high frequency data, Autoregressive conditional duration.

INTRODUCTION

In this paper, we deal with the price effects of duration within a microstructure model of price discovery for an index future contract, the Nasdaq 100. For instance, duration is defined as the time elapsed between consecutive trades. The importance of time in price discovery emerges clearly in Easely and O'Hara (1992) model. In this model, the information flow is not continuous because informed traders choose not to trade from time to time. In empirical studies duration is respectively considered not only as a measure of trading intensity but also a measure of liquidity and a measure of risk. In all the studies of E.g.Jasiak and Ghysels (1998), Engle and Russell (1997), Engle and Russell (1998), Engle (2000), Renault and Werker (2011), Manganelli (2002) and Spierdijk (2004), they consider duration as a measure of trading intensity. These studies show that duration is inversely proportional to the expected return variance. In this field Engle (2000) shows that variation in duration and variation in return variance are linked to the same news events, whereas in the studies of Gouriéroux, Jasiak and Le Fol (1999), Dufour and Engle (2000), Engle and Lange (2001), Engle and Lunde (2004) duration is considered as a measure of liquidity.

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The general result in these studies show that liquidity is an important determinant of bid-ask spread, and that it can be estimated with trading activity-based measures. On the one hand, Dufour and Engle (2000) show that informed traders are more active during periods when the number of informed transactions can be maximised. On the other hand, Renault and Werker (2011), and Ghysels, Gourièroux, and Jasiak (2004) duration is considered as a measure of risk.

With the exception of the econometric analysis of transition Lancaster (1990), the time series models ensure that the time interval between the observations is equal over time, which is not the case with high frequency data.

To provide a structure for the econometric analysis of irregularly spaced data, Engle and Russell (1997) proposed the autoregressive conditional duration (ACD) model combining hazard function and ARCH models. In these researches, the authors model durations between successive market transactions of a stock, rather than adopting the traditional perspective of examining the volatility of the price process. Since the presentation of this model, empirical analysis of time between events listing have developed rapidly in different directions and have incorporated more in the assumptions of microstructure. A common subject of recent theoretical models of microstructure is that the

time between various events such as the transaction whose information affects both the behavior of actors and the process of price formation.

Therefore, the first studies to use the duration as a random variable has been devoted to the analysis of the occurrence of transactions. Besides Engle and Russell (1998), and Shphard Rydberg (1998) analyze the arrivals of orders using a Cox process. Hautsch (1999) examines the time between transactions using a semi-parametric model of chance. Furthermore, Gourieroux, Le Fol and Jasiak (1999) introduce duration-based measures of activity; they define different classes of duration as the duration weighted by volumes. This illustrates the dependence between durations, volumes and price Time or explicitly the transaction duration (the time difference between two consecutive transactions) is considered to be a measure of trading intensity, Engle and Russell, (1997,1998); Engle (2000); Grammig and Wellner (2002); Renault and Werker (2011) and Manganelli (2005). All these studies show that duration is inversely proportional to the expected return variance. For example, Engle (2000) provides empirical evidence showing that variations in duration and variations in returns variance are linked to the same news events. Additionally, in some analysis, duration is considered to be a measure of liquidity, which is noticed in Dufour and Engle (2000), Engle and Lange (2001) and Engle and Lunde (2003). Duration is also documented as a natural measure of the speed by which prices incorporate new information. Dufour and Engle (2000) show that informed traders choose to trade in periods that maximize the number of informed transactions. Duration is also considered as measuring trading risk; see Gouriéoux et al. (1999), Renault and Werker (2011), and Ghysels et al. (2004). In these studies, duration is modelled as a process capturing the risk associated with trading under both price and time uncertainty. For example, in Renault and Werker (2011), duration is split into a deterministic component with transient effects on returns, and a stochastic component with permanent effects on returns variances.

The "time for money", according to Engle and Russell (1998), can be considered as an inverse function of the volatility model. Indeed, a "price-duration" measures the time required for a price change by one person. More time needed to obtain a price change is long, the market is less volatile. This measure of volatility is considered

by many researchers as a GARCH model fits the data at high frequency. In addition to the development of ACD model, other models have been developed to describe the volatility. Jasiak and Ghysels (1998) developed a bivariate model ACD-GARCH which takes into account the interactions between the volatility of returns and past durations. Veredas and Bauwens (1999) formulate a variance of this model: the SCD (Stochastic Conditional Duration) based on stochastic volatility models. Ghysels, Gourieroux and Jasiak (1999) determine a stochastic volatility model with SVD (Stochastic Volatility Duration) which introduces dependencies in the durations.

These different volatility models will allow better analysis of the various intraday processes. Among the various interests of such models, Prigent, Renault and Scaillet (1991) include the adjustment of hedging portfolio. These models can also be very useful to test hypotheses of microstructure, Engle and Russell (1998), Bauwens and Giot (1999) as well as to assess the liquidity offered as Engle and Lange (1998).

HIGH FREQUENCY DATA AND DURATION MODELS

1. The Autoregressive Conditional Duration models:

The main characteristic of high frequency data is the fact that they are irregularly time-spaced. Therefore, they are statistically viewed as point processes. A point process is "a special kind of stochastic process, which generates a random collection of points on the time axis", like in the study of Bauwens and Giot (2001, p.67) . A high-frequency financial dataset contains a collection of financial events such as trades, quotes, etc. and, consequently, the times of these events represent the arrival times of the point process. When different characteristics are associated with an event (such as, for example, the price and the volume associated with a trade), they are called marks, and the double sequence of arrival times and marks is called a marked point process. Point processes are widely used in fields such as queuing theory and neuroscience but have attracted great interest in high-frequency finance over the last few years after Engle (2000) used them as a framework for the analysis of the trading process and of market behavior.

1.1 The ACD models:
The ACD is a type of dependent point process particularly suited for modeling characteristics of duration series such as clustering and over dispersion. This parameterization is the most easily expressed in terms of the waiting times between events.

Let N be the number of events in prices that occurs

randomly during the session. These N events are denoted i=1,..,N observed from the "X" to the last event.

Let $X_i = t_i - t_{i-1}$ be the interval of time between event arrivals, called duration.

ψ_i is the deterministic component which is the conditional expectation of the duration given the past arrival times:

ε_i is the random component;

The multiplicative relationship can be written as follows:

$$X_i = \psi_i * \varepsilon_i$$

Engle and Russell (1998) assume that this component is identically and independently distributed.

$$\varepsilon_t \sim i.i.d$$

This means that the conditional expectation of the time (deterministic component) must capture the dependence of duration in time.

Engle and Russell (1998) suggest and apply linear parameterizations for the expectation given by:

$$\psi_i = \omega + \sum_{j=1}^{p} \alpha_j * X_{i-j} + \sum_{k=1}^{q} \beta_k * \psi_{i-k}$$

Since the conditional expectation of the duration depends on p lags of the duration and q lags of the expected duration this is termed an ACD (p, q) model.

1.2 The likelihood function: The hypothesis concerning the specification of the conditional density of the time allows us to estimate the log-likelihood function as follows:

$$L(X_1,...,X_{N(T)};\theta) = \sum_{i=1}^{N(T)} \text{Log} \, f(X_i / X_1,...,X_{i-1};\theta) = \psi_i$$

and $\psi_i = \int_0^{N(T)} X_i \cdot g(X_i / X_1,...,X_{i-1}) d_i$

Where $g(X_i / X_1,...,X_{i-1})$ indicates the conditional density function of the duration, while is a hazard. If we divide the duration by the conditional expectation function of duration, the residuals are theoretically independent and identically distributed. In this way the likelihood function becomes:

$$L(X_1,...,X_{N(T)};\theta) = \sum_{i=1}^{N(T)} \text{Log} \, f(\varepsilon_i;\theta) =$$

$$\sum_{i=1}^{N(T)} Log\left[\lambda(t / N(t), t_1,...,t_{N(T)} * e^{(-\varepsilon_i)}\right]$$

The log-likelihood function will then depend on the specification and modeling of the conditional intensity. According to the chosen specification, it is possible to

find the conditional intensity function of the transactions. For this, it is necessary to introduce the concept of hazard function. At time t, it is interpreted as the probability of finding of a transaction at time t knowing that there were no transactions for a certain period. The hazard function is the ratio of the density function's length and the survival function of the same duration. This later characterizes the probability of remaining in the initial state for at least y time units.

Let $\lambda_0(t)$ the basic hazard function for standardized lengths, $P_0(t)$ the corresponding density, and $S_0(t)$ the associated survivor function: $\lambda_0(t) = \dfrac{P_0(t)}{S_0(t)}$

regardless of the length distributions (standardized or not), we can write the conditional intensity of events as follows:

$$\lambda(t / N(t), t_1,...,t_{N(T)}) = \lambda_0(t) \left\{ \frac{t - t_{N(t)}}{\psi_{N(t)+1}} \right\} \frac{1}{\psi_{N(t)+1}}$$

The shape of the hazard function depends on the choice of the distribution followed by the different durations.

1.3 The basic specification: The basic reference for ACD (p, q) model is Engle and Russell (1998), they specify the duration X_i as:

$$X_i = \psi_i * \varepsilon_i$$

$$\psi_i = \omega + \sum_{j=I}^{p} \alpha_j * X_{i-j} + \sum_{k=I}^{q} \beta_k * \psi_{i-k}$$

Constraints sign of the coefficients α and β depend on the distribution followed, while the coefficient ω is always strictly positive.

This shows that the first two moments are time-varying because they are calculated from the conditional expectation of times and this regardless of the hazard function. Thus, we have a conditional expectation equal to ψ_i. The unconditional durations, denoted μ, can be written according to Engle and Russell (1997):

$$E(x_i) = \mu = \frac{\omega}{1 - \alpha - \beta}$$

Engle and Russell (1997) demonstrate this result, and indicate that the necessary and sufficient condition to validate the existence of the medium is the presence of all the roots of the polynomial characteristic associated outside the circle of unit root.

The conditional variance is equal to ψ_i^2 while the unconditional variance is written as follows:

$$\sigma^2 = \mu^2 \left(\frac{1 - 2\alpha\beta - \beta^2}{1 - (\alpha + \beta) - \alpha^2} \right)$$

It is clearly noticed that when the coefficient is positive, the unconditional standard deviation is above the average, which means that there is too much dispersion.

2. The Exponential Autoregressive Conditional Duration model: The first model proposed by ACD literature is the EACD model, Exponential Autoregressive Conditional Duration, Engle and Russell (1998). However, we make the assumption which the durations are conditionally exponential where ε_i (the standardized durations) follow an exponential distribution.

Thus the following two equations characterize the EACD model: $X_i = \psi_i * \varepsilon_i$ where ε_i an exponential distribution.

$$\psi_i = \omega + \sum_{j=1}^{p} \alpha_j * \tilde{X}_{i-j} + \sum_{k=1}^{q} \beta_k * \psi_{i-k}$$

The EACD (1.1) model is presented as follows:

$$\psi_i = \omega + \alpha_j * \tilde{X}_{i-j} + \beta * \psi_{i-1}$$

Sign constraints are: the coefficients $\alpha \, and \, \beta$ are nonnegative and the sum of these coefficients must be less than or equal to unity and the coefficient ω remains strictly positive.

Thus the model reflects the autoregressive duration. Due to the positive or zero sign of the α and β coefficients, a short (long) past period leads to the appearance of a short (long) duration. The phenomenon of clustering of transactions is well explained by the model.

The conditional expectation of the duration is calculated as: $E(X_i / I_{i-1}) = \phi_i * 1 = \phi_i$

Where the past information $I_{i-1} = (X_{i-1}, \psi_{i-1})$

The conditional expectation of the duration is equal to:

$$\phi_i = \psi_i \; and \; \varepsilon_i = \left(\frac{X_i}{\psi_i} \right)$$

In this case, the hazard function associated with the standardized duration is equal to unity. Therefore, the conditional intensity function is estimated as follows:

$$\lambda(t / X_1, \ldots, X_{N(T)}) = \frac{1}{\psi_{N(t)+1}}$$

However, this density function is the hazard function of duration. Consequently, the density function of the duration is expressed as follows:

$$f(X_i / X_{i-1}) = \lambda(t / X_1, \ldots, X_{i-1}) * e^{(-\varepsilon_i)} = \frac{e^{\frac{X_i}{\psi_i}}}{\psi}$$

Finally, the Log likelihood function can be written as:

$$L(X_1, \ldots, X_{N(T)}) = \sum_{i=1}^{N(T)} Log(\psi_i) - \left(\frac{X_i}{\psi_i} \right)$$

3. The Weibull Autoregressive Conditional Duration model: Engle and Russell (1998) also propose a Weibull $(1, \gamma)$ distribution for the standardized durations, WACD (Weibull Conditionnal Autoregressive Duration).

The greater flexibility of this distribution from the exponential one is the fact that the conditional intensity function is a function with one parameter; its role is to determine the evolution of increasing or decreasing hazard function.

Thus the following two equations of the model WACD:

$X_i = \psi_i * \varepsilon_i$ where ε_i Weibull $(1, \gamma)$ distribution.

$$\psi_i = \omega + \sum_{j=1}^{p} \alpha_j * \tilde{X}_{i-j} + \sum_{k=1}^{q} \beta_k * \psi_{i-k}$$

The WACD (1.1) model is presented as follows:

$$\psi_i = \omega + \alpha_j * \tilde{X}_{i-j} + \beta * \psi_{i-1}$$

Sign constraints are identical to that of the EACD model. The conditional expectation of the duration between events is calculated as the mean of a Weibull distribution $(1, \gamma)$ is $\Gamma(1 + 1/\gamma)$ as follows:

$$E(X_i / I_{i-1}) = \phi_i * \Gamma[1 + 1/\gamma] = \psi_i$$

We deduce the following equality:

$$X_i = \frac{\psi_i}{\Gamma[1 + 1/\gamma]} * \varepsilon_i$$

The standardized durations can be expressed as follows:

$$\varepsilon_i = \frac{X_i * \Gamma[1 + 1/\gamma]}{\psi_i}$$

Given the hazard function associated with the standardized duration, the conditional intensity function can be estimated by using the formula:

$$\lambda(t/t_1,......,t_{N(T)},N(t)) = \left(\frac{\Gamma[1+1/\gamma]}{\psi_{N(t)+1}}\right)^{\gamma} * \left(t - t_{N(t)}\right)^{\gamma-1} * \gamma$$

From the estimated duration, the standardized density function of the time between two prices events will be expressed as follows:

$$f(X_i / I_{i-1}) = \lambda(t / X_1,......,X_{i-1}) * e^{(-\varepsilon_i)^{\gamma}}$$

That is:

$$f(X_i / I_{i-1}) = \frac{\gamma}{X_i} * \left(\frac{\Gamma[1+1/\gamma] * X_i}{\psi_i}\right)^{\gamma} * e^{\left(\frac{-\Gamma[1+1/\gamma] * X_i}{\psi_i}\right)^{\gamma}}$$

Then the function of Log Likelihood is estimated as follows:

$$L(X_1,......,X_{N(T)}) =$$

$$\sum_{i=1}^{N(T)} Log\left(\frac{\gamma}{X_i}\right) + \gamma * Log\left(\frac{\Gamma(1+1/\gamma) * X_i}{\psi_i}\right) - \left(\frac{\Gamma(1+1/\gamma) * X_i}{\psi_i}\right)^{\gamma}$$

When $\gamma < 1$, the hazard function is decreasing, which means that the probability of having a long duration is low, conversely, if $\gamma > 1$, then the probability of a longer extended trading between events becomes higher.

When $\gamma = 1$, we find the special case where the Weibull distribution is an exponential one.

4. Association between ACD models and market microstructure variables: The original ACD model, Engle and Russell (1998) have led to several extensions. Some authors have sought to improve the explanation of the model by incorporating additional variables, allowing them the same opportunity to test hypotheses suggested by the theoretical literature of microstructure.

As GARCH models, Lamoureux and Lastrapes (1990), Najand and Yung (1991), Foster (1995) the authors interested in ACD models incorporate exogenous variables in the time process to improve prediction and to explain the autoregressive character of the time between transactions.

4.1 The trading intensity: It is defined as the number of transactions during a price duration, divided by the value of this duration. By introducing this exogenous variable in the returns process the number of transactions that occurs within a time period has an influence on prices. If we consider an illiquid share because of its low number of transactions, we can assume that volatility is higher since each transaction has an influence on the price level. Since there is a little activity, the events of prices should be poor and therefore the duration will be long.

Conversely, liquid shares are the subject of many transactions; therefore, the occurrence of significant price changes takes on a frequent basis. The "price-times" are then shorter.

In the literature, which is expanding in recent years, the variables of activities are used as proxy for the arrival of market information. Thus, Lamoureux and Lastrapes (1990) or Najand and Yung (1991) introduce the level of activity as an explanatory variable in the equation of the conditional variance in a GARCH model. The authors justify the fact that the information conveyed by trading volumes influences the level of volatility.

According to Foster (1995), using the generalized method of moments, the activity and volatility appear to be rather directed by the same variable: the rate of information diffusion. In the same way, this reflection was joined in some analysis of Blume, Easley and O'Hara (1992), in which the volume would provide more information on signal quality of market participants.

The Easley and O'Hara (1992) model predicted that the number of transactions involve the price discovery process across information that detects when the transaction is concentrated, and the bid-ask spread should be frequently revised at the quoted price. In contrast the model of Admati and Pfleiderer (1988) predicted that the number of transactions does not affect the intensity of price.

The results obtained by Engle and Russell (1997) tend to confirm the assumptions cited by Easley and O'Hara (1992) as the existing relationship between "price-duration" and the transaction rate increased significantly negative. This means that the time between two transactions is a short price. Bauwens and Giot (1999) confirm this negative relationship by analyzing the display spread on the NYSE.

4.2 The Bid-Ask Spread: All of Engle and Russell (1998), Engle and Lange (1997) as well as Bauwens and Giot (1999) propose to integrate the nominal spread. While the change of the BAS does not affect the modelling process events in prices since the various authors hold the middle of the BAS. However, a wide BAS means that the asset has a higher volatility: there is a greater degree of uncertainty about the fundamental value, or equilibrium value of the assets. Thus, a wide BAS should generate a greater number of significant

price changes, so these transactions should take place more frequently.

This approach corroborates the findings of Engle and Russell (1998), Bauwens and Giot (1999) as well as those of Engle and Lange (1997).These authors, that model respectively EACD (2.2) and WACD (1.1), obtained very significant results, the width of the BAS is negatively correlated with his survivor function: this means that an asset with a small BAS price (wide), allow a long (low) duration between price changes. However, according to Engle and Russell (1998), the presence of BAS variable would not seem to influence the value of the coefficients but the BAS appear to be due to the transaction rate.

4.3 The mean size of orders: Engle and Russell (1998) also introduce the number of assets traded per transaction, which is also significant in the regression, however, it should be noted that the authors use this new variable in a model where two exogenous variables, the BAS and the transaction rate, are already present.

From another part, Easley and O'Hara (1992) consider that in the market there are two kinds of investors: the initiated and the uninitiated. Uninformed agents, also called "liquidity traders" buy and sell for liquidity reasons. For instance, they believe that the observed level can be decomposed into two kinds of volume. There is a "normal volume" which is the level of liquidity through the financial asset; it is the result of trade conducted on the initiative of the uninformed agents. The difference between the observed level and the "normal size" determines the "unexpected volume" corresponding to transactions by informed investors. Thus, the probability of negotiating with stakeholders increases when the volume initiates abnormal increases, which causes a change in the BAS of the market maker faced with the problem of adverse selection.

Furthermore, Bauwens and Giot (1997, 1999) analyze the NASDAQ and the NYSE relation to the abnormal amount and don't get significant results on the NASDAQ. One explanation advanced by the authors is the fact that they should take into account the daily seasonality as Monday effect, Jain and Joh (1988), Foster and Viswanathan (1990). The results obtained on the NYSE, however, corroborate the analysis of Easley and O'Hara (1992).

In fact, the negative relationship between the duration and the size of the transaction can also be explained without using the theory of the price-volume relationship. A transaction results at a large decrease in the depth of the order book, as the probability of receiving another increase of limit price. It should be noted that some authors believe that the size of orders is not significant in the formation process of price discovery, this is explained by the fact that informed investors prefer to move in the market face covered by running small orders to take advantage as long as possible on their inside information. This is one of the foundations of the analysis of Jones, Kaul and Lipson (1994) that demonstrate that the occurrence of transactions which has a role in the volatility, as endogenous variable to the number of transactions.

4.4 The imbalance: On the one hand, Bauwens and Giot (1997) analyze the process of displaying the BAS on the NASDAQ, governed by market prices. On the other hand, Glosten and Milgrom (1985) construct a model of information in which investors and market makers haven't the same information about the fundamental value of the asset they exchange. We can deduce that If there were as uninformed investors in the market, the BAS would be reduced and purchase transaction volumes should be equivalent to seller transaction volume. As the situation differs in the presence of inside investors, they will buy or sell based on their information. Recognizing this, the market maker revises the BAS. According to Bauwens and Giot (2000), modelling the time between BAS may explain variations in liquidity during the session since this model takes into account the past behaviour of market makers and the imbalance of the past market.

DATA SIMULATION ON ACD DURATION MODELS

To illustrate the ACD process, we generated 13,554 observations from the ACD model (1.1) using two different distributions of th ε_i "exponential" and "Weibull". The data relate to transactions on the futures contract on the NASDAQ 100 index with a date maturity from 1/8/1998 to 9/17/1998. This U.S indexes futures contract is traded in Chicago, he was selected primarily for its liquidity. Futures contracts on derivatives are introduced by CBOT in 1975 reflecting the enormous growth of the spot market. This type of derivative has allowed investors to hedge against fluctuations in the index and speculating on their future direction. Each time, four expiration dates are available to the investor: March, June, September and December.

Before beginning the analysis of these data, it is crucial to understand the intra-day system operations in the

Chicago. In this index contracts market, the activities of regular transactions begin at 7: 20 am and end at 2:00 pm. However, market participants can trade during the night. The intraday Chicago Stock Exchange database contains date, time recording, bid, ask, volume of contracts traded and open interest. To filter our data, we removed invalid transactions and daily inter-times to select only those transactions that are inside the regular session. Given the presence of multiple concurrent transactions, we chose to replace them with the weighted average prices calculated as follows:

$$Average = \frac{\sum_{i=1}^{n} p_i V_i}{\sum_{i=1}^{n} V_i}$$

Where n is the number of simultaneous transactions, pi and Vi are respectively the price and the volume of transaction i. We also eliminated the last simultaneous transactions and calculate later times transaction by transaction. Finally, we eliminated the extreme values of durations. A number of observations of 13554 of a total of 28245 is obtained.

1. Estimation of the EACD (1,1) model: the exponential autoregressive conditional duration model: Our model is as follows:

$$\psi_i = \omega + \alpha_j * \mathbf{X_{i\text{-}j}} + \beta * \psi_{i\text{-}1}$$

In this section we will consider the Engle and Russell (1998) model of ACD (1.1). The estimation of this model requires testing the distribution of the error term. These concern the verification of the absence of autocorrelation in the residuals and squared residuals by the Ljung-Box statistic. We will also determine the nature of the distribution using the method proposed by Diebold, Gunther and Tay (1998) and also used by Bauwens, Giot, and Grammig Veredas (2000) besides Bauwens and Giot (2001). In reality, this involves analyzing the density forecast that takes into account the history of the times to determine the distribution of future durations.

$$\psi_i = \omega + \alpha * \mathbf{X_{i\text{-}1}} + \beta * \psi_{i\text{-}1}$$

ψ_i : conditional expectation of the time knowing his past.

$X_{i\text{-}1}$: the interval of time between event arrivals.

Table 1: Estimation of EACD (1,1) model.

Variables	Coefficients	Standard Error	T Student	Significativity
ω	0.1727	0.0513	3.3654	0.0072
α	0.0848	0.0083	10.1085	0.0000
β	0.7987	0.0238	33.4733	0.0000

Residuals auto- correlation
1: -0.0109618 0.0029605 -0.0081758 0.0065795 -0.0025273 0.0032429 0.0048814 -0.0064047 -0.0002657 -0.0075018 -0.0014775
12: -0.0052032 0.0034086 -0.0027731 -0.0031065 0.0049473 -0.0021928 -0.0022029 -0.0028460 -0.0031718

Ljung-Box statistic
Q(10-0) = 5.1144 significance level 0.88340304
Q(20-0) = 6.6142 significance level 0.99777171

Squared residuals auto-correlation
1: -2.46e-04 -2.44e-04 -4.04e-04 -5.29e-06 -3.62e-04 -2.49e-04 -2.48e-04 -4.05e-04 -3.62e-04 -3.42e-04 -3.76e-04
12: -3.78e-04 -2.43e-04 -3.91e-04 -3.81e-04 7.57e-05 -3.79e-04 -3.54e-04 -3.61e-04 -3.98e-04

Ljung-Box statistic
Q(10-0)= 0.0129 significance level 1
Q(20-0)= 0.0292 significance level 1

The results of the EACD (1,1) model estimation corroborate those obtained by Engle and Russell (1998) in the fact that all parameters are positive and statistically significant. Due to the positive sign of these coefficients, a long transaction generates a necessarily long period to the next period. This confirms the dependence effect (clustering).

The results also verify the constraint of sign proposed by Engle and Russell (1998). The sum ($\alpha + \beta$) which is equal to 0,881 and is less than unity implies that the expected duration is composed by two components observed and unobserved. This amount is the duration variable of the transaction.

The Ljung-Box statistic is evaluated at two levels of high delays, indicating no autocorrelation times of the model. This approves that our model is globally efficient and unbiased estimators.

2. Estimation of the WACD (1,1) model: Weibull

autoregressive conditional duration:

$$\psi_i = \omega + \alpha * \mathbf{X_{i\text{-}1}} + \beta * \psi_{i\text{-}1}$$

ψ_i : Conditional expectation of the time knowing his past.

$X_{i\text{-}1}$: The interval of time between event arrivals.

Table 2: Estimation of WACD (1,1) model.

Variables	Coefficients	Standard Error	T Student	Significativity
ω	0.1439	0.0293	4.8977	0.0000
α	0.0826	0.0095	8.6883	0.0000
β	0.7988	0.0216	36.8626	0.0000
γ	0.7952	0.01286	61.8198	0.0000

Residuals auto- correlation

1: -0.0135932 -0.0003587 -0.0102485 0.0042145 -0.0042953 0.0009638 0.0029325 -0.0075917 -0.0013800 -0.0080434 -0.0025133
12: -0.0055951 0.0028031 -0.0031125 -0.0035185 0.0050147 -0.0023380 -0.0022694 -0.0029689 -0.0033100

Ljung-Box statistic

Q(10-0)= 6.2364 significance level 0.79502688
Q(20-0)= 7.9067 significance level 0.99246712

We have assumed in this estimation that the error term follows a Weibull distribution. The estimated results of this model (WACD) are similar to the EACD one. Indeed, the coefficient of the model remains positive and significant respecting the constraint of ($\alpha + \beta$ <1). The parameter γ of the Weibull distribution is less than one; this is the reason that explains why this distribution includes the exponential, Bauwens and Giot (2001) which validates the choice of the error term. As with the EACD model, the Ljung-Box statistic for both levels, agrees that our model generates globally efficient and unbiased estimators.

In Tables 1 and 2, the temporal durations show a significant degree of persistence with coefficients for each estimate in excess of 0.79.Moreover, the stationarity conditions for each estimation, are respected ($\alpha + \beta$ <1), highlighting the impact of transaction time in the models. The auto-correlations of residuals series and autocorrelations of the series of squared residuals, calculated on the data, are significant and indicate a strong dependence on inter and intra-temporal in the arrival rate of transactions. This means that the agents use the "timing" transactions to deliver orders, transactions and volumes. In conclusion, the short durations have different impacts on the profitability of prices, futures contracts that the long durations, and they will use this variable "time of transaction." This learning will lead to herd behaviour, reflecting the state of market psychology.

3. Extensions of the duration model: We have highlighted the ability of the WACD (1,1) model to capture the autocorrelation times between prices events. We try a second time to improve this model by adding new variables in the equation of microstructure along the lines of Engle and Russell (1998) or Bauwens and Giot (2001).

Proposals for additional variables: In this section we will introduce in the WACD (1.1) modelling, four microstructure variables. These variables are as: ***The volume of transactions during the " price event " above***, the volume may reflect the quality of information transmitted through the frequency of matches, and constitute a contribution to the modelling of WACD (1.1) model. The underlying idea is that an unexpected increase of volume in the market indicates the presence of arrival information, which has implications on the process of price formation. Thus, we can assume that the relationship between "price event" and the volume is negative since the arrival of information should result in increased volatility and the number of quotations.

The number of transactions along the precedent "price duration": this variable characterizes the intensity of trade. In fact, a high number of transactions suggests the presence of informed investors in the market. Also, the depth should be much lower than insiders are active in the market. Presumably in this case that volatility is higher after periods of high levels of transaction. We are well located within the theoretical framework formulated by Easley and

O'Hara (1992), and a negative relationship should be obtained from the expected of "price duration" and the intensity of transactions.

The size of BAS at the previous price event: we can define it as a measure of liquidity. In addition, the presence of this variable is justified by the fact that it is supposed to characterize the information asymmetry. Thus, a wide BAS can mean greater uncertainty about the fundamental value of the contract, resulting in greater variability. Therefore, we can assume that there is a positive relationship between the size of the BAS and the "price event."

The price difference justifying the new price event: we can say that over the price differential, the greater the amount exchanged is important. It is estimated the conditional expectation of the "price duration" using the WACD (1,1) model which is added the lagged level of microstructure variables. This model is formulated

as follows: $\psi_i = \omega + \alpha * X_{i-1} + \beta * \psi_{i-1} + \delta Var_{i-1}$

ψ_i : Conditional expectation of the time knowing his past.

X_{i-1} : the interval of time between event arrivals.

var_i : is the level of microstructure variable retained in the *th* price event .

Log likelihood function is identical to the basic model:

$$L(X_1,......,X_{N(T)}) =^{\gamma}$$

$$\sum_{i=1}^{N(T)}Log\,(\frac{\gamma}{X_i}) + \gamma * Log\left(\frac{\Gamma\left(1+1/\gamma\right)* X_i}{\psi_i}\right) - \left(\frac{\Gamma\left(1+1/\gamma\right)* X_i}{\psi_i}\right)$$

RESULTS AND CONCLUSION

All ACD model parameters are estimated as in the seminal paper of Engle and Russell (1998), by the Quasi-Maximum Likelihood, using the procedure of Bernt-Hall-Hall-Hausman. The results of our modelling are shown in the following table:

Table 3: WACD (1,1) durations modeling between price movements of futures contracts with the introduction of microstructure variables.

Variable	Coefficient	Student statistic	significativity
Nominal BAS			
w	12.9699	3.9519	0.0000
α	0.4443	67.5474	0.0000
β	0.4447	157.3038	0.0000
γ	0.8137	333.5505	0.0000
δ	-0.0227	-9.2693	0.0000
Q(10)	8.2262	-	-
Q(20)	9.5360	-	-
Transaction Volume			
w	8.2125	14.2308	0.0000
α	0.4200	83.6278	0.0000
β	0.5151	207.0154	0.0000
γ	0.8183	385.1489	0.0000
δ	-7.2523	- 2.7740	0.0000
Q(10)	7.2393	-	-
Q(20)	12.2380	-	-
The price difference justifying the new price event			
w	11.1718	26.7011	0.0000
α	0.4090	81.05594	0.0000
β	0.5315	266.1759	0.0000
γ	0.8203	360.8799	0.0000
δ	2.9792	41.4168	0.0000
Q(10)	7.8981	-	-
Q(20)	14.6979	-	-

Transaction Number			
w	29.7968	1.6851	0.0919
α	0.2789	10.6582	0.0000
β	0.2927	27.0511	0.0000
γ	0.8083	59.8882	0.0000
δ	-24.6406	-1.5416	0.1231
Q(10)	2.5516	-	-
Q(20)	3.0854	-	-

To sum up, the results of the study show that the expected time between two price events variables significantly related to market microstructure, including the width of the BAS, volume, number of transactions and away from prices justifying the new price event.

In particular, we have shown that the width of the BAS is negatively correlated with the expected price duration. This means that the higher the price BAS is wide, the lower will be the duration between price changes. We also found a significant and negative relationship between the expected duration of price and volume of transactions.

Indeed, an increase in the intensity of market transactions, which is the result of the arrival of new information, increased liquidity and amplify price movements. A relation of the same sign was highlighted between the variable represented by the number of transactions and the expected duration of price. This corroborates the results found by Easley and O'Hara (1992). A high number of transactions presupposes the presence of informed investors in the market, where volatility increasingly high prices and an expected duration of more and weaker. Finally, we demonstrated a positive relationship, which appears to be obvious from the price difference to justify the new event for money and the expected duration of price. The present research allows us to advance the following empirical findings: first, it seems that time has become an endogenous variable that affects how to measure price changes in the concepts of liquidity and volatility. Then, the ACD model we used has shown that high durations are followed by high durations and vice versa. Agents can therefore anticipate the phases of the market where the intensity is conducive to trading. Finally, the time for money can be modelled in combination with microstructure variable. This helps to explain some behaviour of agents and thus complement the many existing methodologies based on the psychology of financial markets.

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IMPACT OF TRADE UNIONISM ON INDIAN SOCIETY

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A B S T R A C T

A Trade union is an organization of workers, acting collectively, who seek to protect and promote their mutual interests through collective bargaining. Trade unions are based upon the concept of "class-struggle" between the capitalist employers and their workers. Tannenbaum traces the rise of unions to the worker's reaction to the philosophy of individualism dominating the 19th and the 20th centuries. The Industrial Revolution destroyed the older way of life and left the individual worker at the mercy of the employer "who became the catalytic agent that crystallized them into a self-conscious group." The worker became completely dependent on others for his livelihood, and "equality came to mean equality for competitive strife. The role of trade unions are considered as essentially reformist organizations and economic institutions based on the Sarvodaya principles of Truth, Non-violence and Trusteeship. Trade unions are important players in today's industrialized world. Trade Unions have three cardinal principles; Unity is strength, Equality of pay for equal work, Security of employment. Trade unions have gradually evolved and have now come to occupy an important place in the modern industrial order, they have now become gigantic associations; they have now become institutions which are interested in the social, cultural and political development of the county. Now-a-days the trade union movement is no longer solely a movement for advancing claims as a movement seeking to increase the material well being of its members but has grown into a force which not only defends the political, social and cultural interests of its members but also carries out special tasks affecting enterprising and intellectual workers especially with regard to their career, jobs, salaries, paid holidays, vocational training, recreational and health improvement programmes etc. The growth of trade unions has been influenced by a number of ideologies, social, economic and even political movements have influenced trade unions in one or the other way.

Keywords: Trade union, Indian economy.

INTRODUCTION

The Industrial Revolution, the consequent property of owners, exploitation of workers by the then newly rich capitalists and the widening gap between the living standards of owners and workers etc. have contributed towards the animosity between the two. "Workers unite" was the message to the workers. This was due to writings of communists, the socialists and others have sown the seeds of distrust between owners and workers and marked the beginning of the class wars between the two. Trade unions are association of workers united with common objective of betterment of their service conditions. Unions are organized in lines of craft or trade, unite service conditions. Unions are organized in lines of craft or trade, unit-wise, industry-wise or even based on political ideologies on state- wise or nation -

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wise. A trade union is any combination of persons, whether temporary or permanent, primarily for the purpose of regulating the relations between workers and employers, or between workers and workers, or for imposing restrictive conditions on the conduct of any trade, or business and includes the federations of two or more trade union. A Trade union is an organization of workers, acting collectively, who seek to protect and promote their mutual interests through collective bargaining. The union is an association of person viz., employers, employees or independent workers/ tradesmen. The union is not casual; it is relatively more permanent and may be temporary for some time. The union's main objective is to secure economic benefits to its members. This is done by collective bargaining. The union influences or affects industrial relations. The union serves the purpose of "checks and balances" on the employers and thus cause "restriction" on management. Union can be a union of more union or

Associations. Trade unions thus play an important role in molding the industrial relations. Union management relations can influence productivity, efficiency and industrial peace substantially. It depends on attitude. Attitude can vary from that of a responsible partnership to that of an irresponsible adversary. Depending on these changes, industrial peace and productivity vary from units to units. Political leadership, public opinion, value system and shop floor ethos, and industrial culture, etc. have varied influence on union management relationships.

The origin of the trade union has been interpreted in different ways by different authorities. Their views are expressed in the form of ideologies, principles, approaches, theories or philosophies. The purpose of such theories has been to explain the basic motivating factors behind union organization, growth and bargaining policies. European approach, represented by Sydney and Beatrice Webb's' (of England) separation of functions, ownership and control and execution. Indian approach is based on the application of the principles of Truth and Non-Violence. Unions grow out of different social-psychological conditions and different temperamental characteristics of the workers; trade unionism is essentially pragmatic and non-revolutionary in its function. "Industrial Autocracy" should be replaced by "Industrial Democracy". The machine is the cause and the labor movement is the result because the machine degrades the workers and makes them insecure. The trade union aims at control over, the machine so as to overcome insecurity.

SOCIOLOGICAL TREND OF TRADE UNIONISM

The Industrial Revolution destroyed the older way of life and left the individual worker at the mercy of the employer. The worker became completely dependent on others for his livelihood, and "equality came to mean equality for competitive strife. To secure a job and to hold it proved to be the test of all else and very means of survival." But man, being a social animal, cannot live alone." Man has to belong to something real, purposeful, creative; he must belong to his job and to his industry or must belong to him." Workers are engaging in an unconscious rebellion against the atomization of industrial society. It is inevitable that a sense of identity should develop among men behaving at a common task. The moral fusion of men physically associated in labour "is an old-age experience". The original organizer of the trade union movement is the shop, the factory, the mine, and the industry. The agitator or the labour leader

merely announces the already existing fact. The emergence of unionism is spontaneous and unpremeditated; it is inherent in the growth of capitalism. It reflects the urge of human beings to create a society. "It is not merely an economic organization, it is also a social and ethical system and its ends are moral and not economic, because it strives to re-establish the values in which man had found his dignity."

SCARCITY CONSCIOUSNESS OF TRADE UNIONISM

The worker as a person with a pessimistic out-look, a feeling of scarcity of economic opportunity and consequently in need of an organization which would control the scarcity opportunity and retain it on some pre-determined and fair basis. "Scarcity Consciousness", "trade union is essentially pragmatic and struggles constantly for the betterment of the economic conditions and relationship through broad schemes of social and economic reform. After analyzing the labour movement in Russia, Germany, Great Britain and the United States, we found that 'working people in reality felt an urge towards collective control of their employment opportunities, but hardly towards similar control of industry. Therefore the "three factors are basic in any labour situations: *first*, the resistance power of capitalism, determined by its own historical development; *second*, the degree of dominance over the labour movements by the intellectuals' mentality which regularly underestimates and *third*, the degree of maturity of a trade union mentality'. Unionism developed because of workers' scarcity consciousness, which arose in the minds of the workers because of the fact that their economic position cannot improve beyond that which is barely sufficient to cover minimum essentials of an ordinary standard of living. Two causes were said to be responsible for this belief. "The typical manuals are aware of his lack of native capacity for coping with the complex business world. He also has the conviction that the world has been rendered one of scarcity by an institutional order of things, which purposely reserved the last opportunity for landlords, capitalists and other privileged groups". Out of scarcity consciousness grew a job-conscious unionism, a unionism, which controls the job opportunity. The union establishes certain job 'rights' which it then rations among the members through regulations applying to overtime, seniority, etc. The union does not replace the employer as the risk taker and the owner of business, but it does become the administrator of the scarce job opportunity. Trade unions are based upon the concept

of "class-struggle" between the capitalist employers and their workers. The study found trade unions as revolutionary and political organizations. They are the instruments for complete displacement of capitalists in government and industry by their revolutionary programme.

TRADE UNION IN INDIA

Trade Union may an association of either of the employers or employees or independent worker. Labour unions are relatively permanent combinations of workers and are not temporary or casual. It is an association of workers who are engaged in securing economic benefits for their members. In other words, it is essentially "a cooperative labour marketing association". Its purpose is to secure control of the supply of labour in one or more markets and to maintain that control as a means of fixing the price of labour as well as the conditions under which it works. Trade union functions which was to defend the workers' rights and interests against the employers and the State, has now changed and given place to a new approach towards its functions, namely, protection of workers and provision for their security; improving the wages, conditions of work and standards of living; raising the status of the worker as a part of industry and citizen of society; and extending the area of social control of the nation's economic life and participating in that control. The trade unions have also been changing constantly. Trade unions change their methods and their working to adjust themselves to changing circumstances. Trade unions have gradually evolved and have now come to occupy an important place in the modern industrial order "From criminal and illegal associations; from institutions which were only very small bodies, they have now become gigantic associations; from institutions that were primarily interested in the advancement of the cause of their own membership, they have now become institutions which are interested in the social, cultural and political development of the county." The trade unions, thus, have made a remarkable progress since their inception. The growth of trade unions has been influenced by a number of ideologies. Social, economic and even political movements have influenced trade unions in one or the other way. The class-conflict and dialectical materialism created a class of trade unionists who regarded labour organization as "absolutely essential for bringing about a revolutionary and fundamental change in the social order. The proletariat must overthrow the present

bourgeoisie class, capture State power and usher in a classless society because the capitalistic class has long exploited the workers. Under capitalism, the principal function of a trade union has been defensive, namely, to fight for the maintenance of the existing wages, to demand (relatively) higher wages, and the betterment of the conditions of work.

The trade unionism to be the extension of the "Principles of democracy" in the sphere of industry, require the trade unions "to be institutions for overcoming managerial dictatorship to strengthen individual laborers and to give them voice in the determination of the conditions under which they have to work." "If the democratic State is to attain its fullest and finest development, it is essential that the actual needs and desires of human agents concerned should be the main consideration in determining conditions of employment. Here, then, we find the special function of the trade union in the administration of industry. In all socialist countries, it has been accepted that trade unions have to take an active part in preparing labour laws concerning labour, production, the way of life, culture and the implementation of these laws. Class conflict is sought to be met through equality and collective agreements and joint consultations. The State recognizes the rights of the people to work, rest and leisure and maintenance in old age, sickness and disability, education and equal pay for equal work. Workers and managers have the same common purpose, namely, to promote the interests of the socialist State with which their own interest are bound up. A trade union may continuous and voluntary Association of the salary earners and employees engaged in whatever industry or trade, formed for safeguarding the interests of its members, maintaining and improving the conditions of their working lives, raising their status and promoting their vocational interests; and securing better relations between them and their employers, through collective bargaining. A trade union is therefore, a device which enables a group /class in industry or trade to bargain with any other class/group on equal footing. It is to be noted that modern trade union retains from its early development. It is economically oriented; it is an instrument of defense; it implies class distinction; and it is an outcome of an individualistic society.

THE GOVERNMENT AND TRADE UNION

The government is regarded as a greater hindrance than the employers in the way of achievement of union goals.

But this order is reversed and this is apparently a paradox. In fact this shows that the interviewees expect more from a democratically elected government, which is wedded to public welfare and has several old trade unionists in responsible Positions, than from the employers. The differential attitude to the central and state governments can be explained in terms of who happens to be at the helm of affairs a party sympathetic to their organization or its rivals. At the time of investigation the Indian National Trade Union Congress preferred the Central Congress Government. In contrast to this the provincial Coalition Government was preferred by the Indian Labor Union and the All-India Trade Union Congress.

GENERAL TREND OF TRADE UNIONISM

"Worker's protest is inherent in industrialization." They offer an explanation of workers' protest which arises due to stress and strain of industrialization. Organized form of protest, according to them, is labour organization. The nature and role of such organization depend upon the industrialization process, the industrializing elite and the specific culture and environment of a country. The leadership of industrialization process is taken by one of the five ideal types, namely, dynastic elite, the middle class, the revolutionary intellectuals, the colonial administrators, and the nationalist leaders. They are of the opinion that the structure, functions, and source of leadership and ideology of trade unions differ with the type of industrializing elites. The role of trade unions and considered these as essentially reformist organizations and economic institutions-based on the Sarvodaya principles of Truth, Non-violence and Trusteeship to promote class collaborations as "capital and labour should supplement each other and live in unity and harmony."

CONCLUSION

There is no one to one match between employee and employer. This is the reason why in the past, workers were exploited by employers such as low wages, hire and fire authority exercised at will, poor working conditions, engagement of workers for long hours like 12 hours a day, arbitrary punishment like flogging', slave trade. That many of them are intellectually talented is evident from the panorama of problems mentioned by them during the course of the interviews. Trade unionists consider themselves as intellectuals and envisage for themselves a role as educators of general public and agents of social change.

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