Volume 24 • Number 2 • Winter 2017

Journal Transition Studies Review

Special Japan Issue - Second Part

The first part of the Special Japan Issue available on the Journal Global Policy and Governance Volume 6 Number 2
www.transitionacademiapress.org/JGPG

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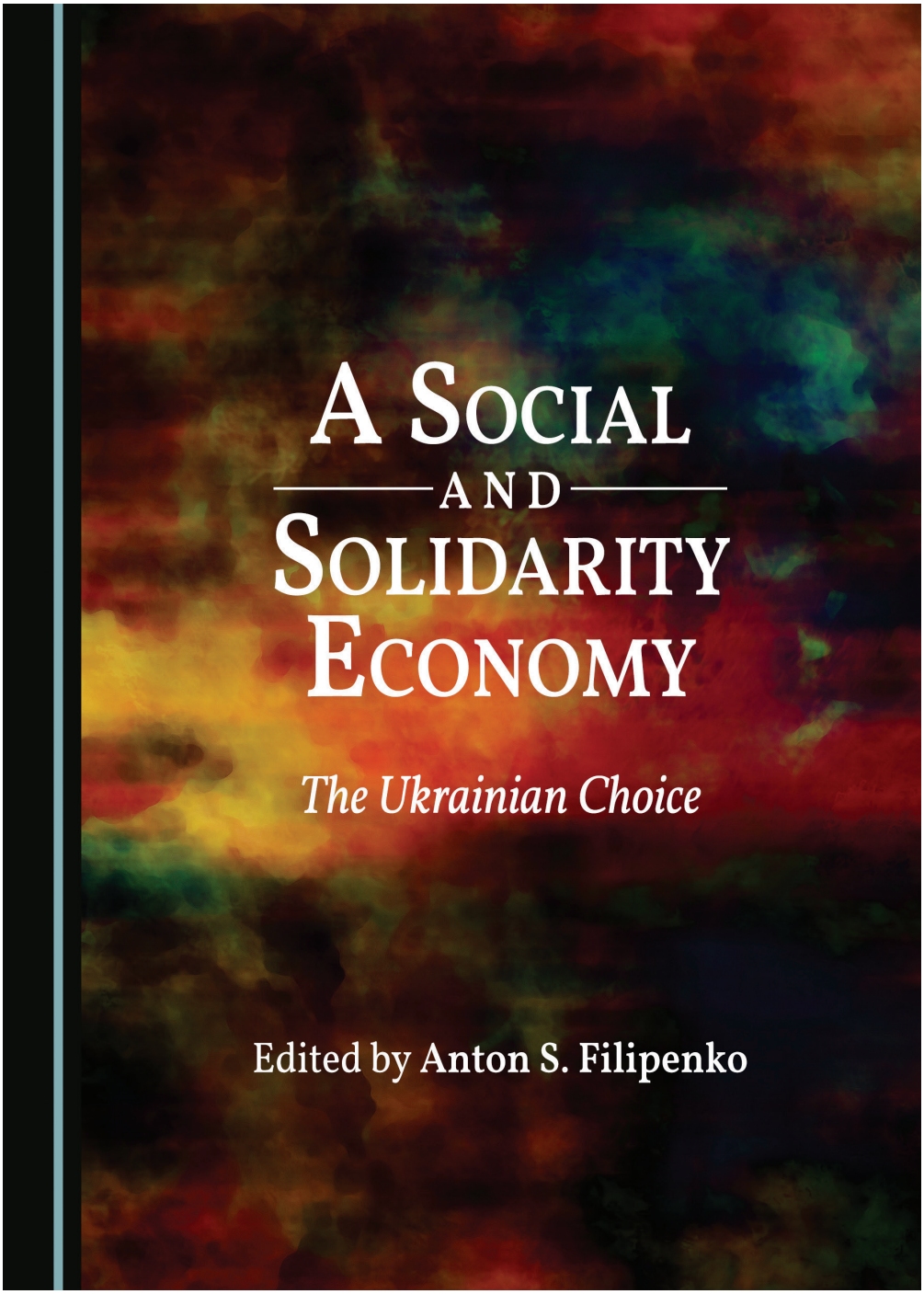
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Edited by Anton S. Filipenko

JTSR (2017) 24: 3-5
DOI 10.14665/1614-4007-24-2-001

SPECIAL JAPAN - SECOND PART
INTRODUCTION

Political and Economic Opening as a Post-Crisis Strategy for Japan

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Key Words Economic growth, Japan, Trade balance, Technological change, Labour market, population, Energy production

JEL Classification O11, J11, H50, M14, N15

In economics literature, the sources of economic growth in general and in Japan in particular have been appraised either from the supply-side, with the emphasis on capital accumulation, labour, total factor productivity and – given the advent of the new growth models – on technological change, or from the demand side. The study on Japanese growth by Chenery et al. (1962) was an early demand-based study that looked at the drivers of economic growth and structural change over the period 1914-1954. Using input-output methods and taking into account the contribution of technological change[11] over this long-time period, the authors found two distinct early sub-periods of economic growth: the 1914-1935 and the 1935-1954 sub-periods. The first (1914-1935) is characterised by a rise in domestic income (by 4.5 per cent per annum) with large increases in exports. The second (1935-1954) is marked by the loss of colonial supplies of raw materials and by a substantial fall in exports; this second sub-period is also marked by import substitution policies and by the rising importance of technological change. The findings for the first sub-period mirror Japan's emergence as an economic and geostrategic power, affirming first its colonial ambitions in East-Asia through the development of its many manufacturing networks, in the region as a whole and in Korea in particular (Inkster, 2001). In post WWII Japan, capital deepening and technological change became the main sources of long-term economic growth in line with the core ideas enshrined in the endogenous growth theories. Economic growth and wealth accumulation had been such that by the late 1980s a small area in Tokyo – such as for example the grounds under Tokyo's Imperial Palace - was valued more than the entire State of California. The shift in investment away from the manufacturing sector and into the real estate sector after the 1985 Plaza Accord had led to the build-up of a formidable financial bubble (Hutchinson and Westermann, 2006). The beginning of the 'lost decade' after March 1989 signalled that Japan was embarking upon a new growth trajectory and that the country was leaving behind several decades of

1 In this study, technological change is measured with the help of the technical coefficients.

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quasi-uninterrupted high growth. The de-industrialisation (kudoka), driven by the dynamic and responsive strategy of Japanese multinational enterprises increasingly investing in the newly opened Chinese market, affected the Japanese economy negatively. For instance, the number of employees in the manufacturing industries experienced a sharp drop: from 14.56 million in 1995 to 11.30 millions in 2011 (Keizai Koho Center, 2007, 2014), although the unemployment rates remained relatively low thanks to an increasingly flexible labour market. The kudoka phenomenon did not however jeopardise the manufacturing and exporting capacity of Japanese corporate firms, as for instance the trade balance remained in surplus during the whole period, except for a short period after the Fukushima nuclear disaster in March 2011. Furthermore, competitiveness is supported by significant public and private investment in research and development (R&D) activities in Japan (3.29% of GDP in 2015 for instance, compared to 2.93% in Germany and 2.22% in France that year, according to OECD data). In the case of Japan, the post-bubble new growth period needs to therefore be appraised through the lenses of economic growth in a mature post-industrial country. Indeed, the new drive for the internationalisation (kokusaika) of Japanese firms in the 1980s was made possible because of the country's strong manufacturing sector. At the same time, and in line with the tenets of the new growth models, technological change has also been earmarked as a key driver of long-term economic growth since the 'lost decade'. Technological change and a deeper integration of Japan into the world productive and trading (manufacturing) system have both implied a number of on-going structural changes notably in the labour market. Non-regular employment, for instance, rose from 15% in 1982 to a comparatively high level of 38% of all employees in 2014, a change that may contribute to Japan's economic competitiveness but that translates into rising poverty for a growing part of the population, and to the drop in the fertility rate (Gordon, 2016). First of all, policy change has been stimulated by the 2008 global financial crisis; as a result, the increasing political and economic interaction of Japan with the outside world has become, more than ever, a strategy in order to revive economic growth. Second, policy change has eventually taken prominence since Prime Minister Shinzo Abe took office in 2012, with the launch of its famous 'Abenomics' policies encompassing three arrows (monetary policy, fiscal policy and revitalisation strategy through, in particular, a number of structural measures). In the same way that the burst of the property bubble in 1989 placed Japan on a 'post catching-up' economic growth path, Abenomics measures are intended to play the role of a catalyst in reviving economic growth in Japan in the not too distant future. Abe's policies are, therefore, aimed at smoothing out the transition of Japan towards a new economic growth regime.

Possibly more so than in any other 'mature' economy, the transition of Japan to a new growth regime offers multidimensional challenges, particularly in terms of demographics, energy production and other environmental issues, and this implies to analyse the characteristics of Japan's deeper integration into both the world economy and the geostrategic environment. Japan currently has the most rapidly aging population (a problem to be shared soon with South Korea), and its population started to decrease from the middle of this century's first decade. In terms of energy production, the shift from nuclear generation to fuel, gas and renewable sources of energy has been dramatic following the Fukushima event in March 2011, but the question of sustainability remains, both from an environmental point of view, and from the viewpoint of the instability of oil prices in the coming years and decades.

The integration of Japan into both the world economy and the geostrategic environment also poses a number of different challenges. These include Chinese firms' ability to rapidly improve their technological level; China, as a nation, being more and more assertive and capable of defending its views; and the relative stability that had prevailed in international trade and

markets being increasingly challenged by the multiplication of specific trade agreements, rather than by multilateral ones, not to mention the instability derived from the election of the new Administration in the USA and missile threat from North Korea.

Articles in this special issue enrich the debate on the transition of Japan to a post "lost decade" and post-crisis growth regime. Since the economic and business issues mentioned above are intimately connected to the political dimension, and in particular with the role of Japan in the East-Asian region and further afield, one of the strengths of the special issue is its combination of articles drawn from the political as well as the economic spheres. This special issue starts by defining and clarifying the institutional framework in which a number of appropriate economic policies can take place; this is done with the inclusion of the article by Tatsuro Chiba on the "second Abe Administration". The paper on the currently negotiated EU-Japan free trade deal by Bernadette Andreosso-O'Callaghan is used as a case study of a potential channel of (external) economic growth rejuvenation. The two papers on human resource management focus on changes in the labour market deriving from the transition towards a low growth regime, leading to the development of non-regular employment on the one hand, and to the demographic transition to an aging population on the other hand. The paper by Shiho Futagami and Yukiko Muramoto addresses the question of ensuring decent work conditions, while the paper by Philippe Debroux, Jacques Jaussaud and Julien Martine focuses on the development of senior workers' employment. The paper by Larissa Grzeskowiak investigates, through a broader perspective, the economic impact of demographic change in Japan, focusing on female labour. Finally, two other articles offer a link between these two levels of analysis (domestic and international): the article on the stock market by Sophie Nivoix and Serge Rey will discuss the role that a key Japanese utility company plays in the domestic stock market, in the context of both financial liberalization/opening and the disruptive Fukushima event. The article by Ikuo Kato investigates the relationship between corporate sustainable strategies and stock prices.

All papers for this edited volume were drawn from a pool of papers presented at the 21st Euro-Asia International Research Seminar held in the summer of 2016 at Pusan Korea National University, South-Korea. This proposed special issue represents a subsequent stage in the research process. Written by well-known authors across Europe and Asia working in the field of Japanese and Asian studies, the different articles include the various and related areas of management, economics and political science/international relations.

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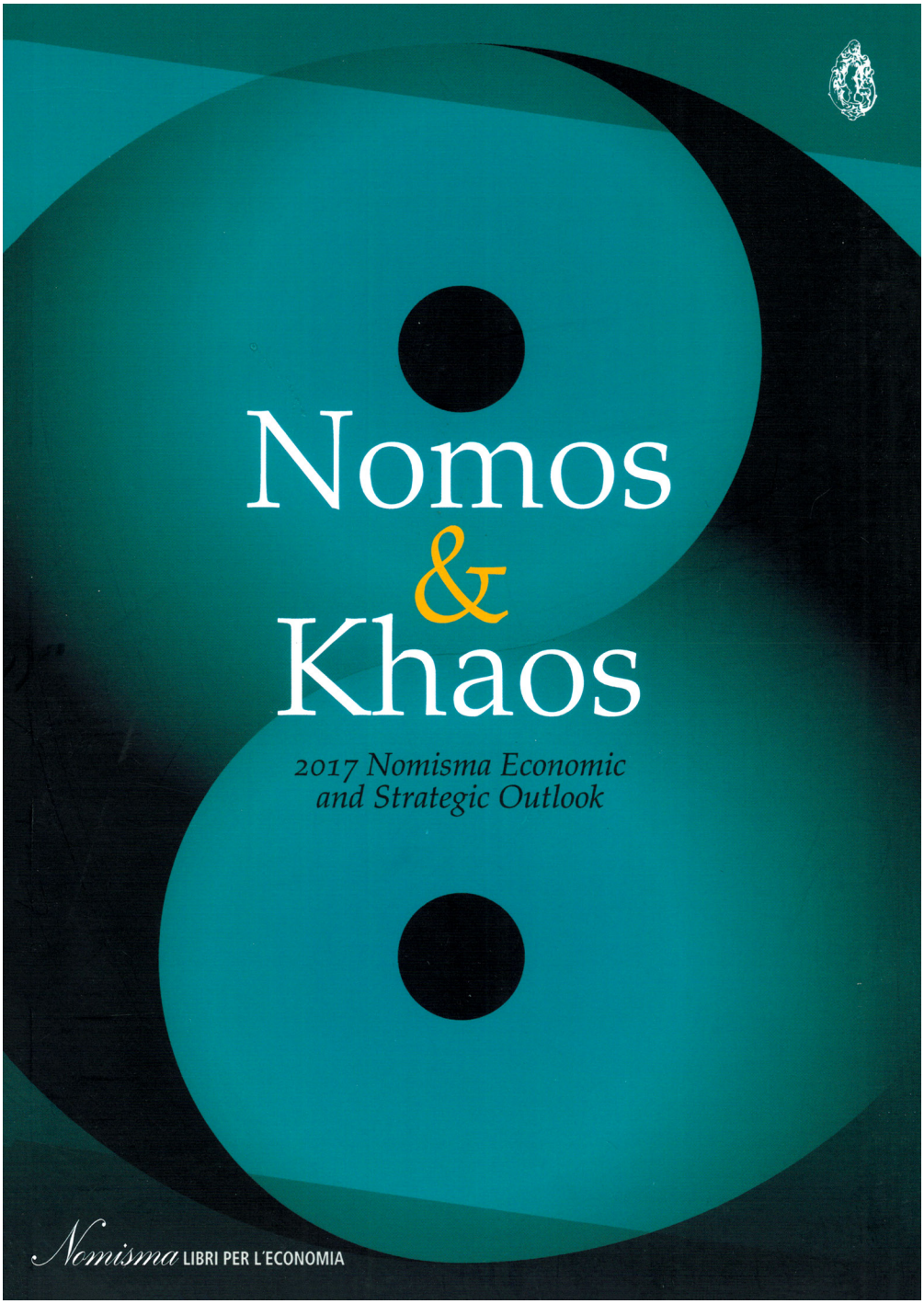
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JTSR (2017) 24: 7-20
DOI 10.14665/1614-4007-24-2-002

SPECIAL JAPAN - PAPER

Free Trade Agreements as a Strategy of Growth Revival for Japan

Bernadette Andreosso-O'Callaghan

Abstract This study highlights the broad industrial areas that are supposed to benefit most from the gains arising from the Japan-Europe Free Trade Area (JEFTA) agreement which has been negotiated since March 2013, and which has recently been agreed in principle between Japan and the European Union. The JEFTA is organized around the core principle of "market access" covering areas such as non-tariff barriers, rules of origin, investment dispute resolution and corporate governance.

After a brief review of Japan's opening strategy, appraised in an historical perspective, the article will delve into the Japan-EU economic relationship and it will highlight the expected objectives of the Japan-EU free trade area. A number of key manufacturing and services areas, such as motor vehicles, electronics and financial services are highlighted because of their relative industrial weight and of their significance in terms of tariff and/or non-tariff barriers (such as for example the high tariff - 10 per cent - imposed by the EU on Japanese exports of motor vehicle parts).

Keywords Japan largest trading partner worldwide and second with EU after China, Economic agreements by Japan, EU more competitive in in new tech, Aerospace agricultural as well as services sectors, Banking, Capital Flow, EPA and ASEAN

JEL Classification F5, F010, E650, O50, G1, F1, F13

1. Introduction

In spite of the many economic challenges faced by Japan since its "lost decade", the country is the sixth largest trading partner worldwide and its economy still accounts as one of the most prominent economies in the world. Because of China's ascendency as a major world economic trading nation, Japan is today the EU's second largest trading partner in Asia (after China) and the trade agreement it has agreed in principle in July with the EU marks an important step in the two partners' willingness to repel protectionist trends at the global level. For Japan, this agreement is enshrined into its contemporary and broad FTA strategy which itself is seen as an engine of economic growth revival. After a brief review of Japan's opening strategy since the fall of the Tokugawa period and of the early Japan FTA strategy (Section 2), the article will focus on the Japan-EU economic relationship (Section 3). It will briefly analyse

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the evolution of this relationship and it will then focus on the Japan Europe Free Trade Area Agreement (JEFTA) by highlighting the broad industrial areas that will benefit most from the gains emanating from the JEFTA. The Japan-EU free trade agreement falls within the category of "deep agreements" covering diverse areas such as public procurement practices, rules of origin and small and medium-sized enterprises (SMEs). Of particular interest to Japan is the manufacturing sector where the elimination of a number of non-tariff measures (NTMs) by the EU could lead to substantial gains, and of critical importance to Japan is also the issue of Brexit.

2. Background: Japan's slow growth and greater opening

By the advent of the 18th century, Japan had managed to keep its sovereignty – unlike other countries in Asia - , but the country was more isolated than in the early Tokugawa period (Jansen, 2000). The relaxation of book imports during the 18th century allowed European knowledge to flow into Japan, starting with the areas of history, institutions and military science; however, all western attempts at wining trade privileges were militarily repelled, until Perry's mission in July 1853. The opening up of two ports (Shimoda in Edo bay and Hakodate in Hokkaido) symbolises the connection of modern Japan to the West, including Europe. The country soon became a locomotive of economic growth in the Pacific area as well as a potent competitor for Europe and the USA in many industries particularly after World War 2 (WW2). Since the late 1970s, internationalisation (*kokusaika*) became a buzz word in official discourse, and the economy was reshaped by several liberalisation and privatisation waves so as to respond to the external forces (*gurobaruka*) that became more pronounced after the oil shocks of the 1970s. After a prolonged period of slow growth and of lost decade(s), the now globalised actor is nevertheless still relatively closed, at least by international standards. When assessing the openness ratio (defined as the trade/GDP ratio), based on a group comprising 75 countries, Japan held a median position in 2013. Understandably, the rise of China and of other emerging economies led to a decline of Japan's share of world merchandise exports (from 8 per cent in 1983 to 4.5 per cent in 2012) and of world merchandise imports (from 6.7 per cent to 4.9 per cent respectively) (WTO, 2013). With a declining population since 2009, and a lack of breakthrough technological change at world level, trade and investment abroad (i.e. further opening) have therefore been mooted as the possible future engines of economic growth by various governments. The Free Trade Area (FTA) strategy is therefore seen as a strategy of growth revival.

2.1. Theoretical motives for greater integration

Much has been written on the trade-growth and trade-convergence relationship following the theoretical insights of Jacob Viner (1950) and the empirical work done by Ben-David (1994) and his followers (for a critical approach of the trade-convergence relationship, see for example Gaulier, 2003). Dynamic customs unions models later borrowed elements from the fields of industrial and regional economics and included elements such as economies of scale arising from more capital accumulation, showing thereby the positive impact of investment (and in particular of foreign direct investment) on growth (Krugman, 1979). Beyond the well-known and dominant economic arguments that clarify the rationale for signing up comprehensive free trade agreements[1] such as trade creation and efficiency effects, one needs to consider

[1] Comprehensive in the sense that they deal with trade in the industrial, agricultural and services sectors and in that they encompass areas such as non-tariff barriers, rules of origin, intellectual property rights, investment dispute resolution, corporate governance, competition policy, as well as safeguard measures and dispute settlement mechanisms. These agreements do not generally embrace the movement of people.

also non-economic arguments. These are the political and diplomatic advantages, which help reduce the likelihood of economic frictions becoming political issues (Pareto, 1889) as well as Japan's increasing global diplomatic influence and interests such as its bargaining power in WTO negotiations. Finally, FTA agreements would help Japan re-balance – and perhaps contain - China in the region as a matter of competitive leadership. According to some analysts (Munakata 2003), Japan's main interest in pursuing greater economic integration is mostly explained by economic motives such as transaction costs minimisation, and adding stimulus to domestic growth, whereas China's motives are rather different. China's moves are mainly aimed at reassuring neighbouring countries such as the countries from the Association of South East Asian Nations (ASEAN) and at expanding its political influence in the region.

2.2. Economic agreements already signed by Japan

Compared with Singapore and South-Korea, Japan is a late comer in the league of modern FTA promoters in the Asia Pacific region. Japan's relatively recent interest in signing FTA deals started cautiously under Prime Minister Koizumi in the early 2000s with the approval by the Council of Ministers for the promotion of Economic Partnership Agreements in December 2004. A more dynamic FTA strategy is credited to Prime Minister Hatoyama (September 2009 – June 2010) who favoured the idea of a trilateral FTA with China and South-Korea, in opposition to his predecessor Koizumi who was reluctant to move on this issue. Hatoyama proposed also an investment pact among the three East-Asian countries, in order to protect intellectual property, and to promote manufacturing techniques and brand names. Hatoyama's FTA strategy signalled a rupture with the position of the Liberal Democratic Party (LDP), who had been in power for most of the years after WW2. By early 2017, Japan had signed 15 economic partnership agreements with the following countries: Singapore (effective since 2002), Mexico (2005), Malaysia (2006), Chile (2007), Thailand (2007), Indonesia (2008), the Philippine (2006), ASEAN (2008), Vietnam (2008), Switzerland (2009), Brunei, Peru, India, Australia and Mongolia.

In particular, the Japan-Singapore economic partnership agreement (JSEPA) opened a new era in Japan's trade policy as well as in trade policy in Asia in general, since it was the first bilateral free trade agreement signed between Asian countries (Terada, 2006). According to Itoh (2005), this agreement also signalled the changing attitude of Japan from favouring a multilateral free trade approach towards one of increasing efforts in terms of bilateral and regional trade negotiations. This agreement allowed each party to eliminate customs duties on goods (Ministry of Foreign Affairs, 2007), allowing for the exclusion of agricultural products (Terada, 2006), a rather non critical area for Singapore. Tariffs were eliminated on 30 November 2002 for 6,928 items, whereas for another 8,315 tariff lines, tariffs were to be phased out gradually by 2022 (International Enterprise Singapore, 2012). Other areas covered by the agreement were services, investment as well as economic cooperation. Proximity, the relatively small size of the Singaporean economy as well as the lack of any serious agricultural issues between the two parties – the latter sector being a relatively protected sector in Japan – explain the choice of Singapore as the first "test" of the new Japan FTA policy (Itoh, 2005). The effects were to be small and were to include the promotion of closer economic ties in the region (KEIDANREN, 2000).

The following agreement was the one with Mexico enacted on the 1st of April 2005 after circa two years of rather difficult negotiations. The choice of Mexico was the result of fierce pressures emanating from the Japanese business community which felt it was being discriminated against on the Mexican market *vis-à-vis* their US and European counterparts, because of NAFTA in the first case and because of the EU-Mexico agreement that entered into force in 1997 in the second case (Itoh, 2005; Solis and Katada, 2007; Ando and Urata, 2011). Understandably,

Japan's agreement with Mexico would, at the time, also help many Japanese firms strengthen their exports in the US and Canadian markets, via Mexico. Another country, which was then extremely keen to sign up trade liberalisation and economic agreements in the South American region, was Chile – a country that had FTAs operating with some 50 partners in the world - and this led to the signature of the Japan-Chile economic partnership agreement in March 2007 and to its enforcement since September of the same year.

In the Asian region *per se*, the countries from the ASEAN were, at the time, an important target for Japan's FTA strategy, and *vice versa*. This explains the signing of economic partnership agreements between Japan and a number of these countries: Malaysia and the Philippines in 2006; Thailand and Brunei-Darussalam in 2007; Indonesia and the ASEAN as a whole in 2008; and Vietnam in 2009, leaving out only Cambodia, Laos and Burma. For most of these countries, Malaysia, the Philippines, Indonesia, Brunei and Vietnam, the trade partnership signed with Japan was the first of the kind. In particular, the Malaysia-Japan Economic Partnership Agreement (MJEPA), which came into force on July 2006 the 13th, did not however influence significantly the bilateral trade relationship between the two nations during the first two years of the FTA (Rahman, 2008). The Philippines signed an economic partnership agreement (EPA) with Japan (in 2006) after more than 6 years of negotiations owing to the difficult positioning of sensitive sectors in the Philippines such as motor vehicles (Van De Haar, 2011). This EPA allowed the Philippino party to secure more concessions on tariff reductions than Japan's other bilateral partners.[2] The Japan – Thailand EPA signed in April 2007 and in force since November of that same year has enabled a substantial reduction or elimination of tariffs for 99.51 per cent of Japanese imports in Thailand in 2006 and for 92.95 per cent of Thai exports to Japan.[3] Of specific note is the Japan-Indonesia EPA signed in 2007, which covers some 90 per cent of all agricultural and industrial Japanese exports to Indonesia (Indonesia Ministry of Trade, 2007). This is a critical partnership for Japan given its high degree of energy dependency and the rich underground resources such as natural gas and oil detained by Indonesia. Consequently and not surprisingly, the Japan-Indonesia EPA incorporates a chapter on energy and mineral resources. This EPA was one of the most significant partnerships from the ASEAN region for Japan, since Indonesia was in 2012 Japan's ninth largest trading partner showing strong economic ties between the two countries. Also mineral-rich and inexperienced in the area of FTAs/EPAs, Brunei Darussalam signed its first EPA with Japan on 18 June 2007 with the aim of enhancing Brunei's investment climate, encouraging foreign direct investment and improving market access with Japan (MOFAT, 2016a). Interestingly, Japan's first EPA signed with a regional bloc, namely ASEAN countries in 2008, appears as a "me-too" strategy given the fact that China and South Korea had already signed comprehensive trade deals with ASEAN, one of the largest trading blocs in the world. The agreement is aimed at complementing and broadening the scope of economic partnerships in the region so as to include the other ASEAN members that had not yet signed bilateral EPAs with Japan at the time. In addition to trade liberalisation, the agreement with ASEAN is aimed at promoting cooperation in fields such as Information and Communications Technology (ICT), intellectual property and SMEs (MOFAT, 2016b). The agreement does not however compel Japan to repeal tariffs on key farm products such as rice, beef and dairy products. This agreement was narrowly followed by the bilateral Japan-Vietnam agreement signed in January 2008. Vietnam is of particular significance to Japan given the importance of Japanese direct investment in Vietnam's industries such as motor vehicles, electronics and electrical equipment and given the then high tariff rates on parts and materials. Under the EPA, Vietnam endeavoured to liberalise imports at a level surpassing that attained in either the China-ASEAN FTA or the Korea-

[2] http://www.businessmirror.com.ph/philippines-reaps-benefits-of-lopsided-free-trade-agreement-with-japan/

[3] http://www.thaifta.com/english/eng_jp.html

ASEAN FTA (JETRO, 2014). The second step in Japan's FTA strategy has been to reach countries further afield than its own region of influence. It is in that spirit that Japan signed in September 2009 its first EPA with a Western economy, namely Switzerland. With tariff levels in the manufacturing sector and between the two parties below average, the agreement implied that most industrial goods benefited immediately from the dismantling of tariffs at the time, leaving a transitional period for a small number of industrial goods. Of all Japan's EPAs, the agreement with Switzerland is one that contains the most advanced customs procedures allowing exporters to issue certificates of origin, as well provisions governing electronic commerce. Expected benefits are a boost to Japan's exports of motor vehicles and household electrical appliances whereas Switzerland would benefit in areas such as instant coffee, aromatherapy oils, cheese and chocolate.[4]

Of a rather different nature is the Japan-India Comprehensive Economic Partnership Agreement (CEPA) that entered into force on August 1st 2011, after five years of negotiations. Critical issues in negotiating market access clauses have been in the areas of generic drugs, durians, sweet corn, curry, black tea, lumber, shrimps (on the Indian export side) as well as in areas such as automobile parts, steel products, electric/electronic goods such as DVD players and video cameras (on the Japan exports to India side). Owing to its size, India is an uneasy partner to negotiate with, and many Japanese firms are concerned that the tariff reduction for many items might occur only in the final tenth year, with no results prior to that. Also, motor vehicles (MV) and MV parts have been excluded from tariff reduction; these are precisely the areas that were to provide the highest gains for Japanese firms (Kondo, 2012).

Another regional dimension in which Japan was keen to participate from December 2011 was the Trans-Pacific Partnership (TPP) which aimed at setting up a multilateral FTA in the Pacific region with countries such as Australia, Brunei, Chile, Peru, Singapore, New Zealand and the USA. The agreement was signed in February 2016 but it became jeopardised since the US withdrawal of the agreement less than a year after. The fact that Japan was negotiating in parallel with some of the TPP countries during the early 2010s shows that the TPP was not a priority for the Japanese government. In this category, one should mention the EPAs signed with Peru in June 2011 (in force since March 2012) and with Australia signed in July 2014 (and in force since January 2015). The Japan-Peru agreement allows the elimination of tariffs on sensitive products such as passenger cars over four to nine years, on motorcycles in five to nine years, and on televisions at the time of implementation. This agreement shows how Japan has been consolidating its zone of influence in the Central and South American region, building on the FTAs concluded with both Mexico and Chile. Again, this strategy is partly motivated by a mimetic effect, so as not to be disadvantaged in that region of the world when compared to Japan's competitors, including the European Union (Gonzalez-Vigil and Shimizu, 2012). The Japan-Australia Economic Partnership Agreement (JAEPA) signed in July 2014 and in force since January 2015 also falls in that category. This is the most wide-ranging trade agreement that Japan ever concluded as it includes also sensitive agricultural products such as beef, sugar, dairy products, wheat and barley (Australian Government Department of Foreign Affairs and Trade, 2017a). The structural complementarity existing between Australia and Japan makes the two partners natural partners (Australia Department of Foreign Affairs and Trade, 2017a and 2017b). With this agreement, Japanese cars would, for example, cost about AUS$2,500 less on the Australian market when the 5 per cent ad valorem tariff is abolished.[5] Finally, the last EPA signed by Japan before the JEFTA is the Japan-Mongolia Economic Partnership Agreement

[4] http://www.japantimes.co.jp/news/2009/02/20/business/japan-switzerland-sign-epa-paving-the-way-for-tariff-free-trade/#.WK3eOn_GC2s

[5] https://www.japantoday.com/category/politics/view/free-trade-agreement-between-japan-australia-goes-into-effect

(EPA) which was signed in 2015 and which entered into force on June 7, 2016. This again was the first EPA for Mongolia (Ministry of Foreign Affairs, 2016a). The agreement calls for an elimination of import tariffs within 10 years on most products traded between the two parties. The trade balance between the two countries is in favour of Japan with Japan's main export items including motor vehicles, construction products and mining machinery.[6]

2.3. Currently negotiated agreements

Other agreements that are currently under negotiation involve Canada and Colombia. The seventh round of the Japan-Canada talks - which were initiated in March 2012 - took place in November 2014 in Tokyo. An internal memo from the Canadian Department of Foreign Affairs, Trade and Development highlights the slow progress of the negotiations, which have not met the expectations given Japan's interest, at the time, in the Trans-Pacific Partnership talks with countries such as Canada.[7] The Japan-Colombia deal is another one that has made sluggish progress since the launch of the talks in December 2012, with the thirteenth and latest round occurring in September 2015 (Ministry of Foreign Affairs, 2015).

Other failed attempts at negotiating trade and investment liberalisation include the negotiations with the Gulf Cooperation Council since 2006, which eventually were suspended. Also, negotiations with Japan's immediate neighbours (in East Asia) have also proved to be rather difficult. In particular, negotiations with South Korea had started in 2003 but broke down. FTAs with East Asia are nevertheless thought to produce the greatest additional benefits for Japan. East Asia is indeed the region where Japanese products account for the highest percentage of trade, and where tariffs have traditionally been among the highest. Consequently, trade liberalization with East Asia would boost activities of Japanese businesses, which are facing competition from ASEAN and China and which, in many cases, have shifted their production bases to locations in East Asia. Finally, a FTA joint study involving China-Japan-Korea (CJK) was undertaken in 2011 after Hatoyama's announcement at a Trilateral summit, an initiative that was warmly welcomed by the PRC. As a consequence, CJK FTA talks were launched in 2012. Among the motivations for Japan in signing a China Japan Korea FTA would be an increase between 0.03 to 1.24 percent of Japan's GDP (Cui, 2013), and an increase of economic welfare by US$ 19.1 billion. Moreover, the agreement could stabilize Japan´s position in Asia by enhancing its economic growth.

From a brief analysis of Japan's FTA strategy, it can be inferred that Japan has used its FTA strategy to address three main challenges: first to boost the competitive advantage of its internationally-oriented firms in selected overseas markets, in line with standard economic theory; second, to suggest a distinct approach to economic integration different from that of both the US and Chinese approaches; and third to stimulate its regional leadership credentials internationally vis-à-vis China (Solis 2008). The focus of these FTAs on Southeast Asian nations shows how Japan is keen to counter-balance China's influence in the broad Asian region and worldwide.

3. The Japan EU economic relationship

Compared with China, Japan possesses an indisputable advantage in negotiating liberalisation talks with the EU in that it is a well-functioning democracy abiding by the rule of law. The EU global strategy launched in the mid-1990s entails indeed the selection of EU partner countries based on economic as well as political criteria (Andreosso-O'Callaghan, 2013). This leaves

[6] http://www.joc.com/international-trade-news/japan-and-mongolia-sign-free-trade-agreement_20150210.html
[7] http://www.huffingtonpost.ca/2015/05/25/japan-canada-trade-talks-_n_7431710.html

China in a secondary position when dealing with economic partnership deals with the EU and when compared with Japan or indeed Canada for example. The EU global strategy entails the strengthening of economic and diplomatic relations with a number of carefully selected partner countries. It therefore builds on the agreements signed between the EU and these countries over the years. In the case of Japan, the two parties were holding regular Japan-EU summits, a graduation from the Japan-EC Joint Declaration of 1991 and from the Japan-EU Action Plan (2001-2010); it is at the May 2011 Summit that the idea of a more legally binding and deep agreement was mooted, provisionally titled a "Strategic Partnership Agreement" (MoFA, 2017a). Consequently, negotiations between the EU and Japan were launched in March 2013 with the aim of concluding the deal by 2016. Of note is the shared aim of a long lasting cooperation between the two parties that would sustain peace, stability and world prosperity.

Before delving into an analysis of the main issues in the talks and in the agreement, this section will first suggest a brief history of the Japan-EU relationship and then a discussion on the strength of the current economic relationship based on a set of macro-economic data.

3.1. Brief history

Owing to the nature of its 20th century history, Japan has not tended to concede an important place to European countries in its post WWII foreign policy when compared to other countries such as the USA in particular. Post WWII Japan-Europe history can be summarised by the emergence of Japanese global firms in key industrial sectors, and by what was perceived in Europe as an excessive penetration of Japanese competitive products in European markets, leading to trade frictions. As a result, Voluntary Export Restraints (VERs) were introduced in sensitive industries such as motor vehicles in order to minimise the soaring Japanese trade surplus with EU countries and to lessen the trade frictions between the two parties. The many anti-Japanese incidents taking place in the EU during the 1970s and early 1980s led the Japanese firms to rethink and reshuffle their international strategies.[8] In addition, the appreciation of the Yen as the result of the 1985 Plaza Accord, and the concomitant de-industrialisation of Japan (*kudoka*) meant that Japanese firms' strategies had to embrace a global strategy based on foreign direct investment. On the EU side, the end of the cold war unleashed "more comprehensive" ties between Japan and the EU (Watanabe, 2013: 4). In July 1991, the first Japan-EC summit took place in The Hague, where Japan's Prime Minister Toshiki Kaifu and the President of the European Commission Jacques Delors signed a Joint Declaration on Relations between the EC – and its members - and Japan. More comprehensive ties were built on the basis of the EU-Japan Centre for Industrial Cooperation which had been set up in 1987 and they implied, for the EU, the definition of a "new strategy" vis-à-vis Asia (European Commission, 1994); this new strategy signified the EU renewed interest in the Asian continent, admittedly because of China's rising economic power. Nevertheless, the steps taken from the 1990s were major building blocks in strengthening the Japanese (and Asian) relationship, which had been limited by then to a "Statement on Relations between the Community and Japan", issued in April 1988. Consequently, diplomatic efforts, economic ties and cultural exchanges began to deepen, encompassing cooperation in the political and foreign-policy spheres.

3.2. Strengths of the current Japan-EU relationship

With a total GDP of about 24 per cent of the world total, the EU-28 is an important economic partner of Japan. Both Japan and/or selected EU member countries are present in major international frameworks such as the UN Security Council (with UK and France being Permanent Members),

[8] The reader interested in the post WWII history of Japan-EU economic relations can refer to Watanabe (2013).

and the G7 (including Japan, the UK, France, Germany and Italy). According to recent data released by Japan's Ministry of Foreign Affairs (MoFA, 2017a), total trade between Japan and the EU-28 reached approximately euro 108 billion in 2016 (16 trillion yen), making the EU the 3rd trading partner for Japan. Conversely, Japan is the 6th main trading partner of the EU-28 in terms of goods. As can be seen from Table 1, the perennial EU trade deficit (in goods) with Japan has tended to shrink since the global financial crisis (GFC) of 2008/09 whereas "Abe's monetary arrow" encompassing the objective of a more competitive exchange rate has been translated into more expensive imports from the EU explaining in part the quasi equilibrium towards the end of the period.

Table 1. EU-Japan bilateral trade flows in goods (1999-2015, mio euros)

Eurozone (18 countries): trade with Japan (all goods)									
Year	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
EU exports to Japan (in million €)	26.935	34.455	34.649	33.350	31.482	33.491	34.228	34.682	34.338
EU imports from Japan (in million €)	55.897	67.725	59.522	53.632	53.075	55.078	53.720	57.560	59.245
Acount Balance (in million €)	-28.962	-33.270	-24.874	-20.283	-21.593	-21.557	-19.492	-22.878	-24.907

Year	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
EU exports to Japan (in million €)	33.692	28.800	34.816	39.470	44.810	43.798	42.997	45.305
EU imports from Japan (in million €)	57.429	44.353	51.510	53.518	49.243	43.679	44.049	45.305
Acount Balance (in million €)	-23.736	-15.533	-16.694	-14.048	-4.433	119	-1.053	-401

Source: Eurostat Database: Extra-Euro area trade by partner and by SITC product group (last update 01.04.2016). http://ec.europa.eu/eurostat/web/international-trade-in-goods/data/database

A refined analysis at product or industry level reveals the following: 1). EU exports to Japan have been catching up in the last years. 2). Japan has been specialized in machinery products to a remarkable degree, a specialisation that has been consolidated in the post GFC years; according to EUROSTAT trade data, the EU's trade deficit in machinery exceeded euros 21 billion in 2016 in spite of a shrinking overall bilateral trade deficit. 3). Bilateral trade in agricultural products is small; in 2016, the EU had a euros 5.4bn surplus in this product category suggesting that there might be greater scope for more bilateral trade in this area; however, protectionism through quality standards is an issue that the opponents to the FTA tend to highlight. In terms of the bilateral trade in services, the EU tends to have a positive balance vis-à-vis Japan. For instance, bilateral trade figures with Germany and the UK, - Japan's two major EU trade partners -, show a strong position of the service

industries of these two EU countries in Japan. In the case of these countries, trade deficits turned into surpluses in 2005 for the UK and in 2007 for Germany, denoting thereby a comparative EU strength in the services and in particular in business/financial services.

On the direct investment front, the EU represented in 2012 about one third of all developed economies' share of Japanese outward FDI, with the UK alone representing about 40 per cent of the EU share (UNCTAD, 2014). A longitudinal analysis, over the period 1990-2010 (Table 2) and still from the viewpoint of Japan, shows the relative importance of a few key EU countries in the Japan-EU direct investment relationship; these are the UK, Germany, the Netherlands owing to their favourable corporate tax regime, and more marginally France.

Table 2. Japanese outward FDI flows (2001 – 2012; in mn US dollars)

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Table 4. FDI stock abroad, by geographical destination

(Millions of US dollars)

Region / economy	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
World	300 115	304 234	335 504	370 541	386 585	449 567	542 618	680 330	740 927	831 076	962 790	1 037 698
Developed economies	222 160	222 915	242 987	262 255	259 634	296 166	346 371	416 451	451 621	488 882	556 944	606 418
Europe	70 430	72 084	87 467	102 118	92 623	119 807	145 268	162 270	176 569	184 191	219 533	242 415
European Union	68 549	70 219	85 687	101 086	91 758	118 822	144 159	160 945	175 013	182 328	215 068	237 169
Belgium	3 647	5 125	7 148	8 819	7 742	9 628	11 978	13 936	14 515	14 130	14 724	16 002
France	2 902	5 387	7 270	12 895	11 278	13 061	12 320	14 843	16 824	16 224	15 782	20 024
Germany	3 930	4 668	6 863	6 967	6 171	7 413	9 450	11 930	15 108	15 327	16 683	16 862
Italy	711	1 053	843	1 089	841	806	830	877	1 101	1 411	2 503	2 698
Luxembourg	902	1 163	895	1 104	760	1 128	3 510	4 309	7 241	9 639	6 982	6 915
Netherlands	19 494	22 815	33 658	36 380	34 447	45 407	63 448	71 798	77 529	76 051	84 786	94 193
Spain	591	847	968	1 146	1 384	1 348	1 723	1 269	1 569	1 564	1 514	1 472
Sweden	1 139	1 062	1 313	1 555	1 557	2 199	2 933	3 038	2 567	1 989	2 669	3 325
United Kingdom	33 116	26 183	24 399	26 757	24 163	31 605	31 774	32 407	31 306	37 984	48 101	53 812
Other developed Europe	1 139	1 260	1 172	1 032	865	985	1 110	1 325	1 556	1 863	4 465	5 247
Switzerland	1 139	1 260	1 172	1 032	865	985	1 110	1 325	1 556	1 863	4 465	5 247

(Source: UNCTAD April 2014 – Bilateral FDI Statistics 2014

In terms of FDI stocks, the EU-Japan balance is in favour of Japan with US$156.1bn in 2012. This is clearly an area where an FTA between the two parties could be advantageous to EU firms. In this unbalanced relationship, a few EU countries only stand out as the main hosts and senders of direct investment with Japan. Again, and in the aftermath of BREXIT, it should be noted that the UK emerges as a main direct investor with 18.5 per cent of all EU direct investment stock in Japan by 2012. This places the UK as the third main EU investor in Japan in stock terms, shouldering closely France (20.9 per cent) and the Netherlands (38.3) although the figures are not entirely comparable and meaningful in the latter case. The UK is the main host for Japanese firms (again after the Netherlands) with 22.4 per cent of all Japanese direct invested stock in the EU-28 by 2102 (UNCTAD, 2014). The economic relationship between Japan and the EU has shifted from trade to direct investment. At the time of writing, more than two-thirds of Japanese vehicles sold in the EU are manufactured in EU countries, stimulating thereby job creation. As noted by Japan's Ministry of Foreign Affairs (MoFA, 2017a), the EU-28 as a whole represents nevertheless the largest share of all inward FDI stocks in Japan (about 10 trillion yen).

3.3. Expected impact of the partnership

An examination of Japan's FTA strategy with other countries than the EU shows that: 1). The highly protected agricultural sector has been gradually integrated in the talks; 2) Apart from Switzerland, other deals have not been that challenging because they were signed with less developed countries presenting therefore a high degree of structural dissimilarity with Japan.

The FTA deal with the EU seems therefore of a more challenging nature, owing to the EU size and also given the industrial specialisation of both regions in similar industries and sectors (such as transport equipment for example). The FTA agreement sought by Japan and the EU belongs to the category of deep agreements covering areas such as public procurement, market access, non-tariff measures (NTMs), technical barriers to trade (TBTs), intellectual property rights, rules of origin, competition policy, dispute settlement mechanisms, investment, SMEs, trade and sustainable development, etc. During the 18 rounds of negotiations, the Japanese delegation has been keen to see progress on the elimination of high tariffs on industrial products, reaching for example 10 percent for motor vehicles and 14 percent for electronic devices (Akaichi, 2015). The EU was keen to see progress on NTMs affecting industries such as motor vehicles, food safety, medical devices and pharmaceuticals as well as on government procurement and the protection of geographical indications. Technical standards in many industries are a dominant issue but the adoption of the 37/47 passenger vehicle regulation during the negotiations is an example of how the interests of the two parties have been converging since the opening of the talks. The weight of the European automotive industry lobby on the discussions might be seen as an influential force explaining some of the progress in this domain (Olsson de Koning, 2012). Also, and as part of the third arrow of Abenomics, some sectors such as medical equipment have been subject to new policies making a deal with the EU easier.

After some 18 rounds of negotiations, an agreement in principle was finally concluded at an EU-Japan summit on the 6th of July 2017, although some technical points still need some fine-tuning and a final version of the economic partnership agreement's (EPA) text needs still to be drafted, at the time of writing. Since then, both parties have been working towards the finalisation of the agreement in a timely manner so that legal revision and translation in EU member languages can be done by mid-2018. This schedule would allow the agreement to enter into force by early 2019 (European Commission, 2017a). In addition to greater openness, there are several projected economic benefits for both sides. The agreement will lift most customs duties representing about 1 billion euro per annum. This estimated gain stems from an elimination of 90 per cent of tariffs for European exports to Japan as well as of 97 per cent of customs duties (European Commission, 2017b). For the EU, exports of processed foods may rise by up to as much as 180 per cent, whereas EU exports of chemical products are expected to increase by 20 per cent; EU exports of electrical machinery are estimated to rise by as much as 16 per cent, according to one simulation exercise. Furthermore, the Japanese market is regarded as an adequate and optimal market for high-tech and high-quality goods such as pharmaceuticals, medical devices, agri-food products, motor vehicles and transport equipment. The expected steep increase in processed food exports can be explained by the fact that 85 per cent of all agri-food products will be entirely duty-free. Additionally, one of the EU's major export interests is pork meat, which in fact is the main agricultural export to Japan. After the agreement, processed pork meat will be duty-free and fresh pork meat exports almost duty-free. Wine is the second most important agricultural export to Japan, benefitting from an elimination of tariffs on alcoholic beverages from day one. Another important export benefitting from the elimination of tariffs is cheese, a market where the EU is already the dominant player in Japan. Tariffs on products from industries where the EU is very competitive will also be abolished such as the above-mentioned chemicals but also plastics, cosmetics, textiles and clothing. Non-tariffs barriers such as technical requirements will also be addressed, for example in the motor vehicles industry and also in the medical devices industry. To facilitate trade in services, horizontal provisions across the services sector are envisaged such as a provision to reaffirm the right to regulate for example (European Commission, 2017b).
From the Japanese perspective, the JEFTA is one of the pillars of the country's growth strategy as

it is enshrined in the 'Global Outreach Strategy' which is one of the three 'arrows' of Abenomics (GoJ, 2014). The agreement is expected to promote trade as well as investment which in turn should lead to higher employment and competitiveness. The most important issue is the elimination of high tariffs on industrial products, especially for motor-vehicles and electrical machinery. The agreement is seen as an opportunity to stimulate competition in Japanese industries as a whole. Just as the EU, Japan has an interest in improving the regulatory issues for Japanese companies operating in the EU with regards to non-tariff barriers. Of particular concern to Japan is the issue of Brexit since the UK is a key trade and investment partner of Japan. For example, in 2012, the UK was host to as much Japanese direct investment as Germany, France and Belgium together (Table 2) and in 2015, nearly 50 per cent of all Japanese direct investment to the EU was flowing to the UK (MOFA, 2016b). As Table 3 shows, the UK is a core trading partner for Japan, particularly in the area of services, the sector in which the EU as a whole holds a strong global competitive position. Japanese services exports to Germany amounted in 2013 only to about 60 per cent of Japanese services exports to the UK. This implies that Japan is very keen to enjoy freer access to the EU market, including the UK market. This shows the strong commitment of the Japanese authorities to the FTA strategy as a means to consolidate peace, stability and economic prosperity at the global level.

Table 3. Japan's Trade in services with Germany and the UK (1996-2013)

Dataset: EBOPS 2002 - Trade in services by partner country

Country	Japan										
Service	TOTAL SERVICES										
Measure	Millions of US dollars										
Unit	US Dollar, Millions										
	Year	1996	1997	1998	1999	2000	2001	2002	2003	2004
Partner	Expression										
Germany	Net	-2.463	-1.990	-1.130	-1.366	-1.234	-1.187	-1.196	-758	-1.024
	Exports	2.411	2.513	2.396	2.280	2.396	2.207	2.327	3.287	4.208
	Imports	4.874	4.502	3.526	3.646	3.630	3.395	3.523	4.045	5.232
United Kingdom	Net	-5.070	-3.952	-2.940	-3.288	-3.637	-2.640	-3.554	-3.145	-2.415
	Exports	3.908	4.373	4.081	3.939	3.610	4.949	4.312	5.231	7.311
	Imports	8.978	8.325	7.021	7.227	7.247	7.588	7.866	8.376	9.725
	Year	2005	2006	2007	2008	2009	2010	2011	2012	2013
Partner	Expression									
Germany	Net	-902	-606	882	4.327	3.005	2.064	1.715	193	660
	Exports	4.560	5.325	7.793	11.398	9.128	7.843	7.697	6.501	6.484
	Imports	5.462	5.931	6.911	7.071	6.123	5.779	5.982	6.309	5.824
United Kingdom	Net	1.708	899	942	2.962	835	2.087	1.483	13	641
	Exports	10.471	10.651	11.935	14.118	11.064	11.945	10.854	9.521	10.299
	Imports	8.763	9.751	10.994	11.157	10.229	9.858	9.371	9.507	9.657

Data extracted on 18 Mar 2017 12:57 UTC (GMT) from OECD.Stat

Source: OECD Statistical Database: "Trade in services by partner country"

Conclusion

Japan's contemporary free trade area strategy can be seen as both an important ingredient and further step in Japan's internationalisation strategy that started after the fall of the Tokugawa period. This contemporary strategy is motivated by the persistence of low growth rates since the outburst of the "lost decade" and it is seen as a pillar of Japan's current growth strategy. From Japan's perspective, the July 2017 FTA signed in principle with the EU adds to the list of FTA or/and economic partnership agreements that Japan has been signing with a number of developed and emerging countries in the last 10 years or so. The agreement with the EU-28 is challenging in that both Japan and the EU are specialised in similar manufacturing industries such as transport equipment for example. However, substantial gains are expected for the EU in the newest tech,

aerospace, defence industry, agricultural as well as services sectors, two sectors where Japan's bilateral specialisation is less pronounced.

With the prospective agreement entering into force by early 2019, economic benefits are estimated to be as follows: the elimination of most tariffs would have a positive impact on EU food, chemicals and electrical machinery exports. For Japan, an important issue has been the elimination of tariff and NTMs in industries such as motor vehicles and machinery, where competitiveness gains would materialise. A greater opening of the Japanese economy to the EU - including the UK - would ultimately stimulate competitiveness at the macroeconomic level, creating employment and boosting economic growth. The FTA agreement with the EU certainly strengthens Japan's contemporary economic relationship with the EU. It is however debatable whether this agreement will reinstitute Japan as the EU's main economic partner in East Asia, as was the case shortly after World War II. The Japanese Government has already signed some 15 FTA and EPA agreements with countries in the East Asian region and further afield (including Switzerland), and the JEFTA can be viewed therefore as one element only in this broad FTA strategy. Ultimately, the JEFTA initiative is critical in counteracting protectionist trends visible at the world level.

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JTSR (2017) 24: 21-29
DOI 10.14665/1614-4007-24-2-003

SPECIAL JAPAN - PAPER

A Study on Work Attitudes of Japanese Employees from the Perspective of Decent Work

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Abstract The study analyses work attitudes of Japanese employees from the perspective of decent work. A survey was conducted in respect of Japanese employees working in engineering and retailing companies. In the study the following questions are asked: What determinants make Japanese employees feel their work to be decent work? What are the consequences for Japanese employees and companies, if decent work is actualized ? Currently, decent work is the key concept in respect of the activities of the International Labour Organization (ILO). In this study, decent work is defined as work of high quality, in which employees feel a sense of achievement, enjoy communication with colleagues and have support for work-life balance. The study clarifies the predictors and outcomes of decent work satisfaction for employees. From the results of multiple regression analysis, employability through off the job training (Off-JT) and on the job training (OJT) opportunities are important predictors satisfying decent work. The variable of the industry also contributes to decent work satisfaction for them. Additionally, high decent work satisfaction could lead to high job involvement for them. Finally, the study suggests effective Human Resource Management (HRM) proposals for Japanese companies from the perspective of decent work.

Keywords Decent work, Work attitudes, Job satisfaction, Job involvement, Employability, Career plan, OJT, Off-JT, HRM, Japanese companies

JEL Classification J3, J5, J7, J8, J20, J26, J81 J83, E26, K31

Purpose of the study

Japanese management is characterized by the traditional practice of so-called lifetime employment, seniority systems and enterprise unions. However, current management practices are changing from this model. Over 30 percent of new Japanese university graduates quit their jobs and leave their company within the first three years of employment commencement, according to the Ministry of Health, Labour and Welfare (2013). In contrast with traditional lifetime employment, many younger workers in Japan want to work without feeling bound to

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one organization, preferring to work at many different companies.

'Freeters' are defined as those between the ages of 15-34 who are not students, and for women, are unmarried 1) who are referred to as 'arbeit (temporary) workers or part-timers' at their places of employment, and are 2) unemployed persons who desire to work as 'arbeit (temporary) workers or part-timers' and are not helping household chores or are not attending school (The Ministry of Health, Labour and Welfare, 2011). 'NEETs' are defined as young people aged 15 to 34 who are Not in Education, Employment, or Training and are not seeking work. Reasons for the rise of NEETs in Japan not only include economic stagnation which has led to high unemployment but also as a reaction by young people against the traditional salary-person path once common in Japan.

According to the Ministry of Internal Affairs and Communications' (MIC) Labour Force Survey (2016), the number of Freeters was 1,550,000. As of 2015, the NEET population totaled about 560,000 individuals in Japan.

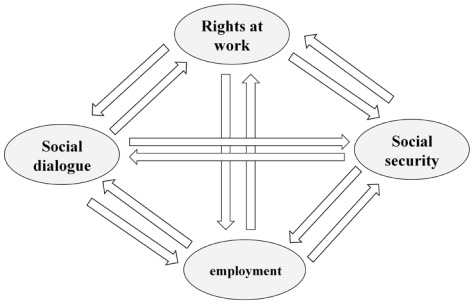
However, they do not have decent vocational education and training opportunities or decent wages. Japanese companies, government and also communities should provide younger workers with decent vocational education and training opportunities as well as decent wages (Futagami, 2010; Futagami et al., 2010). According to the official data from the Ministry of Health, Labour and Welfare, the thorough cost-cutting of the 1990s resulted in a decrease in training expenses as a proportion of the whole labour cost budget (including wages) from 0.36 percent in 1991 to 0.27 percent in 1995; then in 2011 training expenses went down to 0.25 percent.

The situation for working women in Japan is also not decent and there is said to be a 'rice paper ceiling' rather than the 'glass ceiling' commonly referred to in the US (Futagami, 2014b; Futagami and Helms, 2017a, 2017b), because very few women achieve top management positions. According to the Gender Gap Ranking 2016, Japan ranks 111th among 144 countries. When compared with other countries, the rate of female managers in Japan is at a low of 11 percent, and the rate of female directors is very low at 3.1 percent (Futagami, 2014b; Futagami and Helms, 2017a, 2017b). Indeed, many Japanese women are excluded from top management (Futagami, 2010; Futagami and Helms, 2009a; 2009b; 2017b). Furthermore, Japanese women do not have decent vocational education and training, decent promotion opportunities or decent wages.

The word 'decent' was originally used during the Tudor dynasty and means conforming to generally accepted standards of respectable or moral behavior. Currently, decent work is the key concept in respect of the activities of the ILO. Youth unemployement, the wage gap between men and women, child labour, inappropriate work by disabled people, labour exploitation etc. are examples of 'not decent work' (Futagami, 2014a).

The primary goal of the ILO today is to promote opportunities for women and men to obtain decent and productive work, in conditions of freedom, equality, security and human rights (ILO, 1999). As shown in Figure 1, four decent work components are rights at work, employment, social security and social dialogue (Ghai, 2002, 2003). Employment especially is a vital component of decent work (Ghai, 2005). Employment in the decent work paradigm refers not just to wage jobs, but to work of all kinds: self-employment, wage employment and work from home. It also refers to full-time, part-time and temporary work, and to work done by women, men and children (Ghai, 2006). For decent work to be actualised, certain conditions must be satisfied. There should be adequate employment opportunities for all those who seek work (Ghai, 2006). Work should yield a remuneration that meets the essential needs of the worker and family members.

Figure 1 Decent work components



Source : Derived from Ghai (2006)

In this study, decent work is defined as work of high quality, in which employees feel a sense of achievement, enjoy communication with colleagues and have support for work-life balance. The questions in the study are as follows: What determinants make Japanese employees feel their work to be decent work? What are the consequences for Japanese employees and companies, if decent work is actualised? The study analyses work attitudes of Japanese employees from the perspective of decent work based on a survey. The survey was conducted in respect of Japanese employees working in engineering and retailing companies. It clarifies the predictors and outcomes of decent work satisfaction for them. Finally, it suggests effective Human Resource Management proposals for Japanese companies from the perspective of decent work.

Methods

1. Data and research methods

The data for Japan are part of a two country-comparison, Switzerland and Japan. The data were collected by interviews conducted in person with senior managers (HR/personnel/training managers, or others) and also through individual questionnaires for employees. Individual questionnaires were delivered to employees and collected by their HR managers. The analysis of this study focuses solely on the Japanese data to keep the institutional environment constant.

2. Industries surveyed

The survey was conducted on engineering and retailing companies. These two industries were chosen due to their size, their economic importance (Table 1, both sectors cover about 35.0 percent of employment in Japan), and their skill requirements.

To concentrate more narrowly on defined subsectors, 4-digit Standard Industrial Classification (SIC) codes were used in respect of select companies (Backes-Gellner, Futagami et al., 2014). In the engineering subsector the study concentrates on establishments that produce pumps, turbines, compressors, and motor vehicle parts. In the retailing subsector the study focuses on department, grocery and shoe stores.

Table 1 Employment figures of engineering and retailing sectors in Japan

Industry	Number (000s)	Share %
Engineering	10,486	17.0
Retailing	11,105	18.0

Industry	Number (000s)	Share %
Others	39,939	65.0
All	61,530	100.0

Source: Population Census 2005, all employment types included. In this context engineering is synonymously used for manufacturing.

3. Occupations surveyed

The study focuses on intermediate occupational levels. In Japan these skills are mainly gained through company-provided OJT and OFF-JT, whereas they are achieved in apprenticeships in Switzerland. The two intermediate occupational levels surveyed are skilled front-line staff (production workers and sales staff) and first-line management (defined for engineering as production supervisors and for retailing as department managers in large stores or store managers in small ones).

4. Time of the survey

The interviews and questionnaires took place from May 2009 to January 2010.

5. The number of respondents

The total number of respondent Japanese companies is twelve and the total number of respondent Japanese individuals is 148. This study focuses on the analysis of the individual questionnaires which were answered by Japanese employees in Japanese engineering and retailing companies.

6. Questionnaire

The questionnaire includes the measurements of job satisfaction, job involvement, career plans, vocational education and training opportunities, vocational education undertaken and training methods deployed to enhance their employability etc.

6.1 Job satisfaction

Fourteen items of the instrument are statements about job satisfaction based on the revised form of the Minnesota Satisfaction Questionnaire (Weiss, Dawis, England, and Lofquist, 1967).

6.2 Job involvement

Job involvement is the degree to which a person is identified psychologically with his (her) work, or the importance of work in his (her) total image (Lodahl and Kejner, 1965). Six items of the instrument are statements about job involvement (e.g. 'the most important things that happen to me involve my work,' 'the major satisfaction in my life comes from my job').

6.3 Vocational education, training opportunities and employability

The study hypothesises vocational education and training opportunities which are OJT and Off-JT within one year of employment and also the methods by which the employees acquired their employability and work competencies.

6.4 Career plans

Career plans mean employees' perspectives on their career. They include promotion orientation, professional orientation, status quo, no career plan etc. Dummy variables represent whether or not employees have career plans. A dummy variable of 1 is taken as having some career plans and a dummy variable of 0 as having no career plan.

6.5 Face items

The age, sex, job position and the number of job transfers of the respondents etc. were asked.

Results

1. Scale Construction

1-1. Job satisfaction

The exploratory factor analysis was conducted for fourteen items using a maximum likelihood method with Promax rotation (eigenvalue > 1.0) and produced three factors as shown in Table 2-1: (1) wage satisfaction (α=0.881), (2) decent work satisfaction (α=0.693) and (3) career development and support satisfaction (α=0.761). The factor correlation matrix among the three factors is shown in Table 2-2. The factor score was calculated for each factor and the scale was constructed.

Table 2-1 Factor analysis for job satisfaction

	Factor loadings		
Items	**Factor 1**	**Factor 2**	**Factor 3**
Wage compared to the amount of work	.964	.013	-.152
Wage compared to the quality of work	.926	-.043	-.050
Wage compared to colleagues	.726	-.041	.036
Wage compared to competing company	.704	.006	.072
Opportunities for promotion	.537	-.047	.245
Opportunities for job transfer	.374	.333	.026
Decent work (the quality of work)	-.005	.979	-.106
Sense of achievement in work	-.072	.705	.061
Human relations and communication	-.030	.429	.102
Support for work-life balance	.202	.240	.114
On the Job Training from superiors	-.083	-.018	.965
Fairness of treatment from superiors	.010	.083	.636
Vocational education and training opportunities	.259	.203	.345
Fringe benefits (employment insurance etc.)	.262	-.051	.334

Table 2-2 Factor correlation matrix for job satisfaction

Factor	**Factor 1**	**Factor 2**	**Factor 3**
Factor 1	1.000	.569	.519
Factor 2	.569	1.000	.525
Factor 3	.519	.525	1.000

1-2. Job involvement

The exploratory factor analysis was conducted for 6 items using a maximum likelihood method (eigenvalue > 1.0) and produced one factor as shown in Table 3. The factor score was calculated for one factor and the scale was constructed.

Table 3 Factor analysis for job involvement

	Factor loadings
Items	**Factor 1**
1. The most important things that happen to me involve my work.	.926
2. The major satisfaction in my life comes from my job.	.876
6. I am very much involved personally in my work.	.592
4. For me, mornings at work really fly by.	.417
5. I usually show up for work a little early, to get things ready.	.379
3. My work is only a means of earning money. (R)	.140

2. Predictors of job satisfaction and job involvement

Multiple regression analyses were conducted to discuss what predictors determine dependent variables as follows.

Table 4 Multiple regression analysis for job satisfaction and job involvement

	Model 1 dependent variable wage satisfaction	**Model 2** dependent variable decent work satisfaction	**Model 3** dependent variable job involvement	
Age	0.172	0.001	0.155	
Sex (Male=1, Female=0)	-0.055	-0.048	0.022	
Industry (engineering=1, retailing=0)	0.089	0.434*	0.015	
Number of transfer	-0.035	0.019	0.155	
Job position (manager=1, others=0)	0.053	0.166	-0.017	
Employability by OJT	0.260*	0.128	0.025	
Employability by Off-JT	0.198^{+}	0.246*	0.164	
OJT opportunity	0.184	0.215^{+}	-0.125	
Off-JT opportunity	0.069	0.013	0.015	
Wage work satisfaction	-	-	-0.177	
Decent work satisfaction	-	-	0.611***	
Career plan (some plan=1, no plan=0)	-	-	0.314**	
	adjusted R^2 0.137 F-value 2.655**	adjusted R^2 0.090 F-value 2.030*	adjusted R^2 0.369 F-value 5.387**	

***p<.001
**p<.01
*p<.05
$^{+}$p<.10

2-1. Predictors of wage satisfaction: model 1

In model 1 the dependent variable is wage satisfaction which is factor 1 from the factor analysis for job satisfaction (Table 2-1). From the results of the multiple regression analysis, employability by OJT (β=0.260, p<.05) and employability by Off-JT (β=0.198, p<.01) have significantly positive effects on wage satisfaction, as shown in Table 4.

2-2. Predictors of decent work satisfaction: model 2

In model 2 the dependent variable is decent work satisfaction which is factor 2 from the factor analysis for job satisfaction (Table 2-1). From the results of the multiple regression analysis, employability by Off-JT (β=0.246, p<.05) and OJT opportunities (β=0.215, p<.10) show significantly positive effects on decent work satisfaction. Also, the variable of the industry (β=0.434, p<.10) significantly contributes to decent work satisfaction, as shown in Table 4.

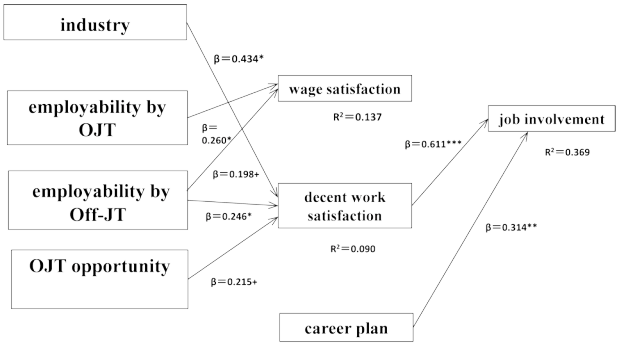
2-3. Predictors of job involvement: model 3

In model 3 the dependent variable is job involvement which is factor 1 from the factor analysis for job involvement (Table 3). From the results of the multiple regression analysis, decent work satisfaction (β=0.611, p<.001) and career plan (β=0.314, p<.01) show significantly positive effects on job involvement, as shown in Table 4.

3. Predictors and outcome of decent work satisfaction

Figure 2 shows the relationship among variables based on the succession of multiple regression analysis in Table 4. It clarifies the predictors and outcome of decent work satisfaction. The predictors of decent work satisfaction are employability by Off-JT, OJT opportunity and industry, while the outcome of decent work satisfaction is job involvement.

Figure 2 Predictors and outcome of decent work satisfaction



Discussion

From the results of the multiple regression analysis, high decent work satisfaction could lead to high job involvement. Thus it could result in high productivity in the workplace, as the evidence is presented to suggest that worker attitudes and behaviour mediate the HRM-performance relationship (Guest, 2002). So it is important for Japanese companies to satisfy decent work for employees in order to increase productivity in the workplace. In this context the concept of 'decent and productive worker' is crucial for future research. The issue is how to manage

an organization so that employees can have decent work and be productive. From the results of the multiple regression analysis, career plans are also important for Japanese companies, because these could lead to high job involvement and thus result in high productivity in the workplace. As discussed in our previous research (Futagami and Muramoto, 2016), about 20 percent of Japanese employees who participated in our survey answered that they have no career plan whereas all Swiss employees have some career plan ($\chi 2$=9.03, df=1, p<.01). If Japanese employees had career plans, they could have high job involvement and this could lead to high productivity in the workplace. Therefore, it is advisable for Japanese companies to put in place career plans for their employees in order to increase productivity in the workplace.

From the results of the multiple regression analysis, employability by Off-JT and OJT opportunities are important predictors to satisfy decent work for employees. Off-JT provides Japanese employees with their positioning or the meaning of their work with respect to the whole business strategy. OJT opportunities within one year of employment also provide Japanese employees with on-going up-skilling opportunities for their work competencies. The variable of the industry also contributes to decent work satisfaction. As discussed in previous research (Futagami et al., 2014), engineering firms spend significantly more on training, which conforms to the assumption that the work of the employees needs higher skills. It means that training costs also could be a predictor of decent work, although the training costs of Japanese companies are decreasing currently as mentioned in the Purpose of the study. Therefore, it is also crucial for Japanese companies to provide employees with vocational education and training for their future employability and decent work.

Conclusion and Future Research

If Japanese employees obtain decent work, namely, they are satisfied with the quality of work, feel a sense of achievement, enjoy communication with colleagues and have support for work-life balance, their job involvement would be high and then this could lead to high productivity in the workplace. Although Japanese management is eroding and training expenses are decreasing, Japanese companies should provide employees with vocational education and training so that they can acquire employability and decent work in the future.

The study mainly focuses on permanent male employees working in engineering and retailing companies. Regarding future research, the incorporation of more industries could lead to meaningful insights. Additionally, interesting perspectives to obtain would be the differences between male and female employees and also those between permanent and non-permanent employees.

Acknowledgement

We appreciate the advice from Prof. Dr. Jacques Jaussaud, the University of Pau, Prof. Dr. Jan Schaaper, the University of Poitiers, Prof. Dr. Uschi Backes-Gellner, the University of Zurich and Mr. Raymond Torres, director of IILS (International Institute of Labour Studies) of the ILO. This study is subsidised by the Grant-in-Aid for Scientific Research© (Head: Prof. Dr. Shiho Futagami) from the Japan Society for the Promotion of Science (JSPS).

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Volume 38 • Number 3 • June 2017

INTERNATIONAL POLITICAL SCIENCE REVIEW

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JTSR (2017) 24: 31-43
DOI 10.14665/1614-4007-24-2-004

SPECIAL JAPAN - PAPER

Elderly Workers in Japan
The Need for a New Approach

Philippe Debroux[1] • Jacques Jaussaud[2] • Julien Martine[3]

Abstract Under demographic pressures, efforts to delay labor market withdrawal have replaced early retirement policies as a management tool of labor supply in many countries. In Japan, as the country is facing a dramatic demographic transition, the employment of elderly workers up to the age of 65 has become mandatory since 2006.

This article discusses the recent developments in this field in Japan and their impact on the employment of elderly workers. It focuses more specifically on how the traditional win-win way of managing elderly employment is evolving under the impact of demographics, the socio-cultural context, the regulatory environment and the consequential need for changes in the social security system. Based on a case study of five Japanese companies, and on other research findings, this paper examines empirically how organisations in that country develop human resource management practices to cope with these environmental transformations and prolong employees' work-life.

Keywords Elderly workers, Population Ageing, Employment, Human Resources Management, Japan

JEL Classification D7, D82, D91, H2, H31, H5, I2, J1

Introduction

Efforts to prolong or sustain working life are increasingly being understood everywhere in a broader and deeper perspective. Surveys suggest that the need to work longer and its desirability in terms of economic benefits and strengthened social engagement are widely recognized (World Bank Group, 2015). Under pressure of demographic ageing, several developed countries have reformed their public pension systems, resulting in longer working lives. It is also pointed out that the productivity of elderly workers can be maintained for certain types of tasks. Because healthy life expectancy is increasing, cognitive decline is found to start later in life. Skirbekk (2013) concludes that individuals are better able to learn at each age, and that cognitive decline occurs increasingly later in life. Learning outcomes are particularly responsive to motivational factors and supportive attitudes in the workplace (Kessler and Staudinger, 2007).

In Germany and Japan efforts to foster a new working life course focusing on workforce participation at older ages, has become central in public policy discourse and labour market

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measures, in view of their demographic profiles. Both countries share rapidly ageing populations and thus the necessity of urgently coping with the treatment of elderly workers. Making the most of the expertise and experience of older workers may be an important factor of economic growth and social stability in both countries (Heywood and Jirjahn, 2016; Debroux, 2013).

However, existing policies are implicitly grounded in stereotypes: younger workers are viewed as bringing new ideas and fresh approaches, whereas older workers, while viewed as reservoirs of knowledge and wisdom, are also viewed as largely devoid of learning and innovation potential. Ageing often tends to be still seen solely from a chronological point of view. In Japan as in Germany, it is often correlated with less dynamism and entrepreneurial spirit, and lower productivity. Some German and Japanese organizations have identified the need for investing in their ageing workforces' potential, and not merely rely on their existing know-how and experience. Nonetheless, labour market age barriers are still prevalent and labour markets are slow and have little dynamism. However, studies show that creativity and drive can develop throughout lifetimes (Bussollo et alii, 2015). Thus, the managing of an older workforce may require public and private initiatives that introduce different work-life balance practices in organizations, at the level of HRM policies, leadership and management that fit in with the multiple characteristics of ageing.

The academic community has also been interested in the study of the employment of elderly workers and many contributions have been provided in the fields of economics, human resource management, gerontology, sociology of organizations, occupational psychology, ergonomics, etc. Taylor and Earl (2016) analyzed cases that illustrate the emergence of some sophisticated approaches to age management in organizations in Germany and Japan. From the cases they consider, it may be concluded that the workforce of the future will be increasingly age-diverse, consisting of mixed-age teams. While a specific focus on older workers may once have made sense, they argue that it is probably more fruitful to view the management of older workers alongside those of other age groups, rather than to consider issues of older workers' employment in isolation (Taylor and Earl, 2016).

Efforts to delay labor market withdrawal have replaced early retirement policies as a management labor supply tool in Germany (Heywood and Jinjahn, 2016). In Japan also efforts have been underway for some time to promote the concept of longer working lives (Yamada and Higo, 2015). Making comparisons with Germany, the first part of the article discusses recent developments in Japan and their impact on the employment of elderly workers. More specifically, we study how the balance on which the traditional win-win way of managing elderly workers' employment was based, is evolving under the impact of demographics, the socio-cultural context, the regulatory environment and the consequential need for changes in the social security system in the specific case of Japan. The second part of this study analyses the practices developed by companies at local level to respond to these labor market environment' transformations, and discusses possible solutions for the future.

1. Contextual background in Japan and its development

General context

German and Japanese companies' eagerness to devise favorable circumstances for the continuing employment of older workers, first arose from the desire of older workers themselves for opportunities to continue working longer, under the right conditions (Dittrich, Busch, and Micheel, 2011; Martine, 2012). This also reflects elderly workers' economic necessity, i.e., the need for income in excess of their retirement allowances (Heywood and Jinjahn, 2016; Sueki,

2013). Second, overall better health means that elderly people are better able to continue working longer. Third, advances in technology and workplace design enable older workers to continue working to more advanced ages (Bussollo et alii, 2015). Fourth, there is a desire for greater work-life balance in order, for example, to fit in family caring and other responsibilities with employment (Loretto and Vickerstaff, 2013; Debroux, 2016).

Organizations need to identify and meet the needs and preferences of both older and younger employees, in order to increase cooperation and prevent conflicts between generations that could impede the optimizing of human resources (Bussollo et alii, 2015). Japanese companies also started early retirement programs in the 1980s (Sueki, 2013) but it was never on the scale of European companies. Overall, Japanese policies have always encouraged the unemployed or inactive back into work or those in employment to delay retiring, in order to avoid long absences from the labour market. This manifested itself in restrictive unemployment allowance policies and in post-retirement policies that combine work, pensions and retirement (Seike, 1998).

Japan has developed an active public policy to support the employment of the elderly since the early 1960s. Among the most representative measures are specific aid for vocational training of the middle-aged unemployed; a quota policy in companies (6 percent of workers aged over 45 in 1971, and 6 percent of workers over 55 in 1976); the 1986 law, which provides a general regulatory framework for the employment of older workers, or the specific job creation policies for this category of workers[1] (Jaussaud and Martine, 2017).

In order to avoid a growing public pension deficit, the age of eligibility to receive a public pension has been raised from 60 to 65. Thus, the mandatory retirement age has been gradually increased from 55 to 60, as required for instance, by the 1994 amendment to the Law Concerning Stabilization of Employment of Older Persons (Jaussaud and Martine, 2017)[2]. This 'workfare' policy has been cost-efficient and effective for both the state and businesses. Labour force participation rates of Japanese males are higher than in Europe for every age group. Among 55 to 59 year olds, less than 70 percent of European males are employed or seeking employment, although Germany is on par with Japan in this age group. The corresponding figure in Japan is 94 percent. In the 60 to 64 year old age group, the Japanese participation rate is almost double the European figure and well above Germany (ILO, 2013).

However, while the strong work ethic of the older Japanese workers and the respect given to age in Japanese culture cannot be denied, there is no indication that it translates into positive practices in relation to elderly workers' employment. As in Western societies, public and business' policies show ambivalence concerning the value placed on older employees. Their contribution is often questioned and their associated costs are claimed to be an impediment to their employment. This seems to reflect overall societal feeling. Care for elderly people strains time and financial resources of both families and country in a period of low growth and stagnating disposable income. As a result, old people are often considered a burden on society and the social security system (Naito, 2009; Martine, 2012). Like in Germany (Hozumi, 2013) the accelerating ageing of the Japanese population in the context of labour markets and technology changes, challenges the assumptions of business models with regard to wage structure and career development (Sueki,

[1] In 1979, with a budget of 57.4 billion yen, the Ministry of Labour set a goal of creating 100,000 jobs for senior workers. To achieve this objective, it provides a subsidy covering 60 percent of the workers' wages. For the hiring of a worker in the 45-54 age group, the subsidy is for a period of one year, extended to 18 months for the hiring of a worker of 55-64 years. For SMEs, the wage support is 80 percent (Kayanuma, 2010).

[2] Since April 2013 male workers' eligibility age for the fixed part of the public pension is 65 (it will be the same for female workers from 2018 onwards). The eligibility age for the earnings-related part of the pension will increase gradually from 2016 onwards to reach 65 for all organisations in 2025 (Ministry of Health, Labour and Welfare (MHLW), 2014).

2013), leading to reconsideration of the basis of elderly employment. Thus the demographic transition resulting from the rapid ageing of the population challenges employment and human resource management practices. In Germany, flexible schemes such as shortened working hours (Kurzarbeit)[3] have been introduced, where public subsidies are provided to pay for part of the wages (Hozumi, 2013). In Japan also, the emphasis of the incentive-driven workfare concept is shifting gradually towards state intervention, reflecting increased social concern. This responds to the perceived necessity of reinforcing the social safety net, while stopping the drift towards non-regular employment, which is thought to be detrimental to the economy (Song, 2014). For instance, under the 2001 Employment Measures Law, it is forbidden to apply age restrictions when recruiting. Furthermore, a new amendment to the Act Concerning Stabilization of Employment of Older Persons obliges companies to keep their employees at work up to 65, the age at which they are eligible for public pensions.

The Japanese Workfare Policy and its current Drawbacks

Selected workers have always been allowed to stay at work after mandatory retirement age in Japan. For many retirees 'bridging jobs' between career occupation retirement and full retirement were available, and still are for workers under the April 2013 amendment to the Act Concerning Stabilization of Employment of Older Persons. In the case of routine and menial jobs, gradual retirement often takes the form of a switch to part-time employment. Many jobs are kinds of 'mini jobs' that are also found in Germany and which provide complementary financial resources (Hozumi, 2013). However, many older Japanese workers are still performing the same skilled jobs post-retirement that they were already performing before official retirement, but with lower wages, which is not the situation in Germany.

The large differential in post-mandatory retirement compensation comes from the fact that even in the cases of similarly demanding jobs, re-employment generally comes with a shift to a lower paid, non-regular employment status (Imai, 2011; Kondo, 2016; Martine, 2017)[4]. Companies were able until recently to devise policies enabling them to take advantage of existing skills and experience at relatively low cost. Thanks to government incentives to retain or recruit older workers, companies may be eligible for subsidies for offering re-employment or extended employment at lower cost[5]. Thus, it is possible to pay retired workers about 30-50 percent[6] less than before retirement, which makes them competitive compared to younger workers (Martine, 2012).

For a long time there was no obligation on employers to keep workers in employment beyond the employers' mandatory retirement ages. Therefore, they had strong bargaining power in negotiations with workers who wished to continue working. However, retired workers were also entitled to receive part of their pensions while working. Flexibility by elderly workers in respect of wages often meant de facto acceptance of age discrimination, because similar jobs held by regular workers were better paid. Nevertheless, receiving about 75 percent of their former wages (state financial incentive included) explains why many retired workers accepted these job offers.
Shedding redundant workers by transferring them mid-career to another company used to be

[3] These shortened work hours are reserved for certain categories of workers according to income and age.
[4] Aside from fixed monthly wages, those workers also receive salaries under pay-by-the job schemes resembling those widely used for sales personnel.
[5] Wage subsidies are also available through the unemployment insurance system to full-time workers aged 60-64 who earn less than 75 percent of their former wages, so that the difference up to 75 percent is paid for through the unemployment system (Martine, 2012).
[6] Compared to male workers in the 55-59 age bracket, workers aged 60-64 receive on average 29.1 percent lower wage levels and workers aged 65-69 earn on average 35.7 percent less (MHLW, 2015).

standard practice until about a decade ago. It provided the opportunity to retrain the remaining selected workers (especially blue-collar workers), even those in their 50s. By doing so, those workers maintained appropriate levels of skill and ability necessary to pursue work-related activities after mandatory retirement. But the transformation of the industrial structure has made it more difficult to transfer redundant workers. Large Japanese companies have looser relationships with suppliers, reducing the opportunities for transfers. Suppliers are more reluctant to recruit elderly workers, whose work experience and knowledge may not fit in with their needs. This is true of manufacturing but also of the services sector where long-term relationships with customers are a key success factor (Nabeta, 2011). As a result, companies have to manage redundant workers they would have been previously able to transfer out of the companies.

The growing pressure to prolong employment

Japan's pension system is reevaluated at least every five years to balance premiums and benefits in line with prevailing socioeconomic conditions (Hansen and Imrohoroglu, 2013). With those conditions currently unlikely to improve much, if at all, the minimum rate of pension for 60 to 64 year old workers is quite low by international standards, i.e., about 45 percent of wages at the time of retirement and it may continue to decline, increasing the necessity for elderly workers to work longer under favorable employment conditions (OECD, 2013). Elderly Japanese need to be able to maintain their standard of living, while taking care of parents in a country where more than 5 million people are over 80 (OECD, 2015).

Mandatory retirement at 60 still remains legal and the Japanese government does not seem eager for the time being to postpone mandatory retirement until 65. Currently, few companies have increased retirement age to 65 (Honda did it, for instance) or scrapped the mandatory retirement system[7] because of the perceived loss of flexibility in respect of workers' employment conditions, and the consequential financial strain that this could entail (Nabeta, 2011). However, a new amendment to the law in 2004 obliged companies to put in place by June 1, 2006 an employment system aimed at expanding employment rights up to the age of 65[8]. Accordingly, with a new amendment to the law in April 2013, the loophole permitting companies to retain only selected workers between 60 to 64 years old is closed (MHLW, 2014). They are now required to retain all workers who want to work up to the age of 65.

Japan has been successful in social and economic terms until about a decade ago in pursuing a different policy from that followed by European countries, including Germany, in terms of elderly workers' participation rates in the labour market. But, paradoxically, it could be argued that the mandatory retirement age at 60 combined with de facto acceptance of age discrimination, and the large differential in the treatment of regular and non-regular employment, have contributed to explaining the higher labour force participation rates for older workers, but also the under-optimizing of their capabilities[9]. Financial incentives and partial access to pensions have made

[7] In 2016, 16 percent of Japanese companies have a mandatory retirement age of 65 or more, and only 2.7 percent (0.5 percent of large companies) do not have mandatory retirement schemes (MHLW, 2016).

[8] Employers can choose between three options: 1. The keeping of mandatory retirement age at 60 while assuring employment up to 65 (koyōenchō seido); 2. The extension of mandatory retirement age to 65 (teinenenchō); 3. The abolition of the mandatory retirement age (teinenhaishi). This new regime was directly linked to the reform of the pension system that envisioned the gradual rise of the public pension eligibility age (MHLW, 2015).

[9] The relatively low age of retirement and the flexibility in terms of re-hiring have not encouraged companies to invest in the training of workers over 50 years of age. Those still having useful skills could be re-hired but without considering whether they could acquire new skills and knowledge. The others would

discrimination palatable to retired workers. But as the conditions to keep the system in place are no longer applicable, it is no longer sustainable.

A crucial issue then is to understand how Japanese firms manage to keep elderly employees at work, both in terms of their employment contract conditions and in terms of their working conditions adapted to their age and, at least to some extent, to their potentially reduced capabilities. This is what we investigate in part II.

2. Methodology and findings

Methodology

In order to investigate how Japanese firms manage to keep elderly employees in work, we first researched a number of cases that we could identify by means of a literature review in English, French and Japanese. We also conduced survey interviews with managers in Japanese public organizations and with Japanese and non-Japanese academics who are HRM specialists. We carried out in addition in-depth interviews in 2014 and 2015 with five large Japanese companies, two of which are in the manufacturing sector (automotive parts and components, machine tools) and three in services (general retail stores, banking, and insurance). The five companies have each between 750 and 10,000 employees, and employ post-mandatory retirement workers in the 60 to 64 years old and the over 65 years old age segments in various capacities.

Semi-structured interviews were conducted (each between 50 to 60 minutes) in the HRM departments and with three line managers in each company over the period 2014 to 2015. The survey questions focused on eliciting data about the following four matters:

- the current situation with regard to elderly employment (the 60 to 64 years old and the over 65 years old workers' categories): the characteristics of the workers, types of jobs they perform and their working conditions, processes of selection of the workers and follow-up after selection (training, personal and career counseling), current key issues and problems;
- planned changes in policies and practices related to elderly workers and the reasons for the changes in their selection, work status, appraisal, rewards, training and development;
- issues that come to the fore in implementing the changes, such as the short-term and long-term impact of regulatory changes on elderly employment; the overall impact of changes in elderly workers' management on the other workforce segments (for example, on the patterns of career development and on overall wage curves); the more heterogeneous expectations of elderly workers regarding their careers; the inter-generational relationships in the workplace; - and finally, the development of new policies and practices in order to cope with the above-mentioned issues.

Findings and discussion on specific examples from HRM practices

Adaptation to the regulatory environment

The five respondent companies share the view that mandatory retirement at 65 would be counter-productive for elderly employment in the current environment. All of them intend to stick to the 60 years old mandatory retirement age for the time being. Unlike the government who would like to see a shift away from non-regular employment, they believe that mandatory retirement at 65 could encourage employers to dispense with regular employees several years before they reach mandatory retirement age. However, they also think that mandatory retirement will be increased up to 65 and even to 67 or above in the future. They acknowledge that they have to prepare for

just leave the organisation or be re-hired for menial work.

this but they point out that it must go in tandem with a revamping of the regulatory environment. Notably, they want to gain enough flexibility in order to have employees fitting in with their needs at reasonable cost, requiring changes in the right to lay-off regular workers. However, it is unlikely that legal changes will go in that direction for the time being. Added to the difficulties in securing qualified younger manpower in some occupations, it also forces the companies to reconsider in the longer perspective their training, dispatching of workers to other companies and integration policies in respect of older workers.

During the last decade (up to 2013) the two respondent manufacturing companies state that directly re-employed workers (including in subsidiaries) amounted to about 30 percent of total retirees, a large majority of them being production workers continuing to work full-time. In the retail company, the ratio was close to 20 percent and was about 15 percent in the financial institutions. In the former three cases most of the jobs were unskilled and semi-skilled, part-time jobs. In the financial and insurance businesses, retirees with high levels of specialization have the opportunity to start a business on their own and most do not remain in the company. The two manufacturing companies and the retail chain have non-regular employees who are over 70. They state that the number of employees between 60 and 64, and over 65 is likely to increase in the coming years because of a shortage of labour. On this point, the literature shows that older workers appear to be an indispensable human resource in overcoming the shortage of labour caused by the exodus from rural areas in certain Japanese regions, like Shikoku and Kyûshu. The same is also true for certain occupations where the elderly are employed in jobs not wanted by younger people[10] (Martine, 2011).

Efforts to integrate older workers

Productivity is not only an individual but also a team concept, and the skills of older and younger workers may be used complementarily in some contexts. Grund and Westergaard-Nielsen (2008) point out that companies with workers of mixed-ages are more profitable than those with exclusively younger or older workers[11]. Similar to what is observed in German companies (Heywood and Jinjahn, 2016), the two respondent manufacturing companies' efforts are made at different stages to accommodate the needs of older workers in accordance with this line of thinking. Efforts are made to mix younger and older workers (mostly pre-retirement workers but with awareness that a sizeable number will continue to work after mandatory retirement) in production teams. Specific equipment is developed and facilities revamped, and working times and standards are adjusted in order to fit in with the older workers' characteristics. Martine (2011) reports the case of Japanese industrial companies that have developed specific production lines for older workers, for instance by reducing the speed of the production line under the concept of "'Daremo Dekiru Ka', literally, "transformation to make it accessible to all".

In the Japanese service sectors where productivity is low (Ueda, 2012) improvement is likely to be linked to the adoption of technologies, including in the fields of the three service-related respondent companies. Increasingly higher (Information, Communications and Technology) ICT literacy is required and a grasp of new (mostly) internet-driven business models is a must. Good opportunities can be created for elderly employees with the right skills or the capability of acquiring new skills. Among other similar case studies, Taylor and Earl (2016) give the example of a German cleaning and care services organization that recognized that those who carry out such activities often can no longer continue to do so at older ages. Thus, the company offers such workers the

[10] In Japanese, these non-desirable occupations are called "3 Ks" (pronounced "sankei"), an expression incorporating the letters of the words painful, dirty and dangerous (Kitsui, Kitanai, Kiken).

[11] Although it is also pointed out that the results are mostly mixed. Age diversity can lead to problems of communication and conflicts if it is not managed carefully (Heywood and Jinjahn, 2016).

opportunity to retrain in dementia care at its expense. The case studies challenge stereotypes concerning the ability of older people as skill learners. So, their conclusions point in the same direction as the ageless society concept promoted by both the Japanese and German governments, where the dichotomy between older workers and the others would be erased. Taylor and Earl (2016) point out that this involves the provision of new skills but also the need for attitudinal change. In another case, they describe a Japanese staffing agency that focused on resetting the 'vocational mind' of older workers, so they could better adjust to new activities that required a different job experience and an implied different status level. Workers received training on role expectations and how to do the job, so that they could more effectively manage the transition into the new roles. The intent was to reduce the likelihood of an employer declaring, according to the organization, that 'older people are hard to deal with' (Taylor and Earl, 2016). Martine (2011) investigates, among other cases on this issue, the case of a Japanese firm in the care for elderly people sector, which recruited housewives who having already raised their children, were willing to go back to work. While first entrusting them with non-qualification tasks, the firm actively supported them to be trained and prepared to secure the national qualification of certified care worker. During the 5 year period preceding the study, the average age of those who got the certificate in this firm was 54.

Need for work innovation

This being said, however, all five respondent companies declare that they seldom continued to invest in the up-skilling of the large majority of over 50 years old workers these past 10 years, especially white-collar workers. Their opinion is also similar in relation to the difficulties in creating enough good jobs for elderly people inside the companies. An approach that the two manufacturing companies mention is the possibility of swapping workers with other companies, in order to offset their respective personnel weaknesses or to transfer workers, who are under-utilized in both technical and managerial jobs, to another company. Nevertheless, these actions will not be sufficient to provide good jobs for all older workers who seek them.

The percentage of self-employed older people in Japan is already quite high (World Bank Group, 2015). However, the respondent companies also state that the adoption of innovative new work patterns that encourage workers to undertake 'second careers' is necessary, as salaried personnel in another company but also as self-employed mobile 'free-agents' in connection with, or not, with their former employers. Consultancy assignments drawing upon the technical and social skills of former employees are mentioned as examples of knowledge utilization, which can provide retired former employees with opportunities to utilize their talents. They can be called upon at short notice, do not require training and permanent support, and can be trusted to deal with commercially sensitive know-how that has to remain confidential within the organization and not be sold on to rivals; furthermore, they are less expensive than other external consultancy services[12].

The respondent companies all started 'second career' programs twenty years ago, for example in developing cafeteria-type training unrelated to the actual jobs performed by the workers. This was in line with the deregulation of temporary agency work in the 1990s, which became a key element in the government's objective of increasing external labour mobility, especially of middle-aged and elderly workers[13]. However, with the legal obligation of keeping workers in employment

[12] In many respect they are very often close to the 'pseudo self-employed' that are found in Germany (Heywood and Jinjahn, 2016). They are used by a single client company as an outsourcing tool, as part of cost control.

[13] Through revision of the temporary agency work regulations in 1994, occupational limitations for workers above 60 were almost completely removed. Only activities that are not permitted are listed in the legislation. The objective of the law is to expand employment opportunities, especially after retirement (Ministry of Labour, 1994).

until 65, there is a need for up-scaling and enlarging the scope of the programs. The respondent companies declare that it is beyond the means of individual businesses alone to do this. They claim that it can only be done in collaboration with public (national and especially local) authorities and private organizations, such as employers' organizations and chambers of commerce[14].

The respondent companies recognize that monetary and non-monetary incentives are needed to maintain high performance and organizational commitment, especially if older workers stay in the labour market out of necessity. Companies acknowledge that they could end up with low productivity, elderly, 'trapped' workers. This is all a more plausible hypothesis because of the emphasis on acquisition of firm-specific skills that makes Japanese workers (especially elderly workers) much less mobile than those in other advanced economies.

Although elderly Japanese workers are more likely to be in the labour force than in Western countries, once unemployed, the chances for re-employment are not good and the duration of their unemployment is long. This calls for a lifecycle approach to labour force activity that would increase the chances of prolonging employment, by ensuring the acquisition of higher and more adaptable skills at work. Similar to Germany where workers over 50 remain unemployed for more than one year on average (Heywood and Jinjahn, 2016), mixed opinions about older workers' costs, technological competence, flexibility, and ability to adapt to new work patterns often undermine efforts to lead companies to recruit and retain older workers, and limit the options for continued employment (Iwata, 2003). In general terms, it is pointed out that productivity decreases are observed in tasks where problem solving, learning, and speed are important, requiring "fluid" abilities, whereas for tasks where experience and verbal abilities matter more, requiring "crystallized" abilities, less reduction or no reduction in productivity occurs among elderly workers (Skirbekk, 2008).

Analyzing the case of Japanese companies employing significant numbers of older workers, Martine (2011) highlights the qualities attributed by employers to this workforce. In a country where quality of service is an integral part of business culture, elderly workers seem to be particularly appreciated for their reliability, expertise, availability, attention to detail and ability to anticipate customer needs. It is as much their experience and competence that are valued as their social skills, which add value to the services offered in sectors, such as catering and the hotel industry. Similarly, in a country where consumers themselves are ageing, older salespeople seem to be appreciated for their age-proximity to this growing customer base. Our five respondent companies are appreciative too regarding older workers' loyalty, dependability, and judgment. The maintenance of company values and enhanced customer service through continuity of roles, are good reasons for employing older workers. Manufacturing companies point to the skills and experience of older employees being valuable in assuring safety at work, and in transmitting to younger workers the philosophy of the company in this regard, for instance in mixed-age teams. Emphases on knowledge retention and transfer requires companies to recognize the need for inter-generational exchanges, for instance in areas such as industrial machinery maintenance and plant management. However, they make rather negative assessments of their attributes in areas that could be considered "fluid" abilities, such as technological competence (including, but not limited to IT literacy) and functional flexibility, which are viewed as critical in today's workforce and may be more important than the "crystallized" abilities that workers have accumulated over time.

[14] The Silver Human Resource Centers (employment agencies) are a source of part-time, relatively low-skilled, subsidised community service employment. The Association of Employment Development for Senior Citizens, consisting of employer groups that receive financial support from the government, has been commissioned by the government to encourage companies to devise strategies for retaining and employing older workers. The efforts include counselling and advice on working conditions that foster the employment of older people, adjustment to HRM systems to adopt HRM policies that encourage their employment and improve working environments.

The problem is serious in the case of white-collar employees who very often have not acquired new skills in their 50s. It may take a generation before more specialized white-collar workers, who made their careers under performance-driven evaluation and reward systems and have received more specialized training, replace the current white-collar generalists. But the two manufacturing companies add that appropriate skills and experience are also increasingly a concern in the case of elderly blue-collar workers. Technological and market environment changes lead to de-skilling of many occupations, but also to the need for the up-skilling of others. Many blue-collar workers have skills and experience that are not suitable for the new types of jobs in their own field. This calls for changes in job and career design (and subsequent specific training in some cases), a task that requires time and financial resources and, first of all, a focused fine-tuning of the selection of those who should be trained, their working conditions and reward systems.

In the finance and insurance companies, listening and counseling activities are organized yearly for the over 55 year old employees. This is also the case for the two manufacturing companies but only every two years for employees from 56 years old onwards. The companies declare that they want to know as accurately as possible the learning potential but also the career intentions of those workers. This helps understanding to what extent they will be able to take advantage of older workers' capabilities after mandatory retirement (workplace location, working hours, scope of duties, etc.), and the type of training they might need.

It could be argued that the shift away from the seniority system may be beneficial to (some) older white-collar workers. Especially when coupled with skills erosion, the seniority system undermines efforts to promote the employment of older white-collar workers – too many of them are not re-employable in skilled jobs. In the future, companies can be further encouraged to continue to devote resources to the specialized training of older workers, who already have specialized knowledge and still have learning potential.

The opportunities of higher status flexibility

In view of the disparities in terms of business needs, skill levels, physical capabilities, and variety of lifestyles and time availability, many workers are likely to continue to shift to non-regular jobs after retirement. At the same time it is a plausible hypothesis that regular-type jobs can also be created for these workers. Although the rules relating to lay-offs are unlikely to be changed abruptly, a gradual evolution can be expected. It will probably be linked to the emergence of new working statuses that will dilute the regular – non-regular status dichotomy and lead to "limited" (in some dimensions) but regular-type jobs with access to bonuses, fringe benefits, and equal salaries for equivalent work. Because of the jobs limitations (no overtime, flextime, narrower job scope) it would be possible to compromise over compensation, if the terms of the deal are transparent and legally protected. It could make regular elderly employment more affordable to companies, while responding to elderly employees' needs for smooth transitions to definitive retirement.

A growing number of companies have introduced the status of limited regular employees (Gentei seishain) for older employees. This is the case in respect of the five respondent companies. Employees are given the choice between different options in relation to the scope and requirements of duties (difficulty of tasks, physical and psychological requirements), working hours and workplace location. The scope of the work often remains the same as that of pre-retirement regular employees, but working hours are generally shorter with the introduction of flextime schedules for those who have care duties or prefer to decrease their working time. Generally, a mix of different working conditions can be observed. In the two respondent manufacturing companies the programs focus on geographic restrictions. They provide for transfers from the company and re-employment with five years contracts in subsidiaries, where

the workers are expected to stay until definitive retirement. Wage levels differ according to the cost of living in the workplace location and the scope of the work. Wages are in the range of 65 to 75 percent of pre-retirement wages. There are cases where the jobs' characteristics are similar to those of typical regular employees in terms of working hours and scope of the work, but the jobs are geographically limited. Conversely, there are cases in which the jobs' scope and duties are limited, as well as working hours in order to satisfy the need for workers to take care of elderly parents. Key points are discussed with the unions in respect of the maintenance of internal company equity, in the setting of different wage levels on the grounds of the varied job limitations. It leads to the creation of arbitration rules that are kept as consistent and simple as possible.

Conclusion

Older Japanese workers' issues are factors in the broader transformation of HRM practices, notably in challenging the regular and non-regular status dichotomy that has been the hallmark of postwar HRM architecture. While pursuing a pro-active workfare policy, Japanese authorities and companies have never really considered until recently policies that would favour older workers' employment in good working conditions (decent wages, consideration of age limitations in term of working hours undertaken, mobility, scope of work), and a smooth transition toward retirement. The gap between mandatory retirement age and the age of eligibility for public pension benefits, combined with financial incentives, have made many companies complacent in this respect.

There is a need for flexible pathways as a means of increasing the length of working life. The self-employment option might be promising for some employees, but older workers are likely to remain salaried personnel. If non-regular work conditions can provide decent work for a large number of 60 to 64 year old retired people, and limited regular-type jobs can be created for some of them, convergence with other advanced countries would put Japan in the mainstream of advanced countries, where retirement age is shifting towards 67 and even 70 years of age (World Bank Group, 2015). The issue of providing decent jobs for all workers would remain hard to tackle as it is in Europe, but it should become more palatable for businesses and the unions to accept a move towards mandatory retirement at 65 and even older. As a result it could lead to the building of an employment system making the best use of the older workers in economic and social terms.

However, the question remains as to what would be widely regarded as decent jobs and job conditions in Japan? Is there any possible basis for a widely shared view on such issues in the country? What would be the characteristics of these jobs and their associated conditions? These are questions that need to be carefully addressed…

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JTSR (2017) 24: 45-62
DOI 10.14665/1614-4007-24-2-005

SPECIAL JAPAN - PAPER

TEPCO's (Tokyo Electric Power Co Holdings) Stock Behaviour in the Long Run

Sophie Nivoix[1] · Serge Rey[2]

Abstract Noting the huge impact of the Fukushima accident on TEPCO's (Tokyo Electric Power Co Holdings) activity and stock price, this study investigates the long-run patterns of returns and volatility of its stock, relative to the main return and volatility features of the Nikkei 225 over the past 30 years. The best fitting volatility for both series comes from an asymmetric power GARCH model; the standard deviation of volatility does not depend primarily on large innovations. For the Nikkei, large negative changes are not more clustered than positive changes. A regime-switching correlation model with three states reveals that a high correlation regime is the most frequent for TEPCO, with low switching probability, whereas the regime associated with the Fukushima crisis is less persistent. A strong interaction arises between the less common regimes, but the stable, low volatility regime appears mostly independent. In two regimes, the Nikkei returns have significant and negative effects on TEPCO returns, but the reverse is not true. The Fukushima environmental and industrial crisis thus could spark a new energetic era in Japan, including a real transition toward more environmentally friendly electric power.

Keywords Stock market, Japan, Risk, Volatility, Earthquake, Electric utility companies, Regime-switching model, MS-VAR model

JEL Classification C1, C24, C32, G00, G01

1. Introduction

Analysing the volatility returns of a stock or stock index is particularly interesting when the specific economic, financial, environmental, or industrial context is sensitive to key events. For example, following several environmental and financial shocks, the Japanese utility company TEPCO entered a new period of growth and risk. Its unique situation, as the main electric and nuclear power utility for Japan, and powerful market reactions to events involving this company make it particularly interesting to study. In particular, the Fukushima catastrophe prompted substantial abnormal returns for TEPCO's stock. To leverage this pertinent and interesting case, we investigate the impact of several internal and external events on TEPCO's activity over a 30-year span. We compare these effects with trends in the broader Nikkei 225 index, to compare

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market reactions and the effects on stock return volatility. By assessing these long-run changes in market valuations, we help explain some transitions in the Japanese electric sector. With our comprehensive, econometric study of the market valuation of TEPCO, as a critical actor in the Japanese economy, we seek to identify main volatility breaks, analyse return correlations in the long run, and reveal any regime-switching dynamic correlations.

Furthermore, we seek to establish the best fitting model for volatility with generalized autoregressive conditional heteroskedasticity (GARCH) modelling. Günay (2015) asserts that the Markov regime-switching GARCH (MRS-GARCH) outperforms other GARCH models, so we include it in our tests. Marcucci (2005) further posits that the MRS-GARCH model performs better in the short run, but other GARCH models may be better adapted to long-run modelling. Boudt et al. (2012) also offer strong evidence of time variation within regime volatility. The consideration of GARCH models may have interesting implications, considering either the weak form of the efficiency market hypothesis or its semi-strong form. The weak form implies that all the available information is included in the present asset prices, which means that the use of past prices is useless for the investor who tries to forecast future prices. The semi-strong form implies that the market prices include all public information about the firms, i.e. all data about internal or external events. As a consequence, no abnormal return should be detected in the return series, and no abnormal profit should be reached by investors. The tests of various autoregressive conditional heteroskedasticity (ARCH) models reveal that the best fit for the volatility of both series is provided by the asymmetric power GARCH (APGARCH), which implies that the standard deviation of volatility does not depend on absolute large innovations or unexpected changes in asset market prices.

With regard to the regime-switching correlation, we test it with the Markov Switching 2 phases and 3 phases. According to Hamilton (1989), in this type of model, the state variable that controls the regime is exogenous. For TEPCO, exogenous factors include the general economic situation, factors that influence the electric utility industry, regulatory or environmental changes, and an earthquake. That is, TEPCO did not enter into an industrial transition voluntarily but instead was pushed into it by external events. For the Nikkei index in general, the exogenous factors include Japanese interest rates, exchange rates, and political or environmental issues. In a regime-switching correlation model with three states, we determine that the high correlation regime is the most frequent for TEPCO; a momentum effect also was more frequent than a mean-reverting effect. A high volatility Regime 3, which is characteristic of the Fukushima crisis, is less persistent. Regime 1, which indicates low volatility, has a very low probability of switching. In Regimes 1 and 3, we uncover a significant and negative effect of Nikkei returns on TEPCO returns, but no effects of TEPCO returns on Nikkei returns. These results suggest that TEPCO has a limited influence in the Japanese stock market, even during crises. Conversely, TEPCO's returns largely depend on market moves.

In the next section, we present our study data and methodology, followed by the main results of our volatility econometric analysis in Section 3. Then we detail the market reactions to key events that affect both TEPCO and the Nikkei 225 in Section 4, before we conclude in Section 5.

2. Data and methodology

We test various ARCH models for both the Nikkei and TEPCO returns. We also outline the data that inform this study.

2.1 ARCH models

To compute volatility, we use daily returns R_t. If $R_t = 100.\ln(P_t / P_{t-1})$, then $R_t = \mu + \varepsilon_t$, for which μ is the average of R_t, conditional on past information ψ_{t-1}. Before estimating the GARCH

model (Bollerslev, 1986; Engle, 1982), we test for the presence of ARCH effects in the residuals ε_t of the stock return model. With a null hypothesis of no ARCH effects, the test statistic is $LM = T.R^2 \sim \chi^2(p)$, where T is the sample size, and R^2 is computed on the basis of an $AR(p)$ process for ε_t^2. Furthermore, volatility σ can be computed with the standard deviation of daily returns in a GARCH model, defined by $\sigma = \sqrt{h}$, where h is the conditional variance derived from GARCH(p, q), such as:

$$h_t = \delta + \sum_{i=1}^{q} \alpha_i . \varepsilon_{t-i}^2 + \sum_{j=1}^{p} \beta_j . h_{t-j} \tag{1}$$

where $\delta > 0$, $\alpha \geq 0$, and $\beta \geq 0$, because these conditions are sufficient to ensure a positive h_t. Then ε_t is the residual of an underlying process for a set of information ψ, such that $\varepsilon_t / \Psi_{t-1} \sim N(0, h_t)$, so it is weak white noise (implying a constant, finite variance). Unconditional expected variance exists when the process is covariance stationary, that is, $\sum \alpha_i + \sum \beta_i < 1$.
Accordingly, we estimate seven ARCH models for $p=q=1$.

2.1.1. GARCH(1,1)

Conditional variance is expressed as

$$h_t = \delta + \alpha . \varepsilon_{t-1}^2 + \beta . h_{t-1} .$$

By construction, this GARCH model is symmetric. But the curves of the causality measures for bad and good news should differ, so the most probable case is that the curves are asymmetric. The subsequent models take such asymmetry into account.

2.1.2. EGARCH(1,1)

Unlike the GARCH specification, the exponential GARCH model (Nelson, 1991), specified in logarithms, does not impose negativity constraints on parameters. We retain the following specification:

$$Logh_t = \delta + \alpha \left[\frac{|\varepsilon_{t-1}|}{\sqrt{h_{t-1}}} - \sqrt{2\pi} \right] + \gamma \left[(\varepsilon_{t-1}) / (\sqrt{h_{t-1}}) \right] + \beta Logh_{t-1}$$

2.1.3. GJR-GARCH(1,1)

The Glosten-Jagannathan-Runkle-GARCH model (Glosten *et al*. 1993) includes leverage terms to model asymmetric volatility clustering. Large negative changes are more likely to be clustered than positive changes. Therefore,

$$h_t = \delta + \alpha . \varepsilon_{t-1}^2 + \gamma . I_{t-1}^- . \varepsilon_{t-1}^2 + \beta . h_{t-1} ,$$

where $I_{t-1}^- = 1$ *if* $\varepsilon_{t-1} < 0$, $\delta > 0$, $\alpha \geq 0$, $\beta \geq 0$, and $\alpha + \gamma \geq 0$. In this model, good news $\varepsilon_{t-i} > 0$, and bad news $\varepsilon_{t-i} < 0$ have differential effects on conditional variance.

2.1.4. TGARCH(1,1)

Threshold GARCH has been defined by Zakoian (1994) as

$$h_t = \delta + \alpha|\varepsilon_{t-1}| + \gamma|\varepsilon^{+}_{t-1}| + \beta\sqrt{h_{t-1}}$$

where "+" is a positive exponent, and γ denotes the coefficient of leverage effects. In this model, the standard deviation depends on both absolute innovations and the influence of large innovations relative to the traditional GARCH(p,q) model.

2.1.5. NGARCH(1,1)

In the nonlinear GARCH of Higgins and Bera (1992), the conditional standard deviation is a function of both the squared lagged conditional standard deviation and innovations raised to power 2:

$$h_t = \delta + \alpha(\varepsilon_{t-1} + \gamma\sqrt{h_{t-1}})^2 + \beta h_{t-1}$$

2.1.6. PGARCH(1,1)

The power GARCH model can is an extension of the NGARCH model; it has the same structure, except that the conditional standard deviation and the innovation are raised to the power of Φ:

$$(\sqrt{h_t})^{\phi} = \delta + \alpha\varepsilon^{\phi}_{t-1} + \beta(\sqrt{h_{t-1}})^{\phi}$$

As Bollerslev (2008) acknowledges, the estimates for Φ are lèss than 2 in most financial rates of return.

2.1.7. APGARCH(1,1)

The asymmetric power GARCH model (Ding *et al*., 1993) "nests the most popular univariate parameterizations" (Bollerslev, 2008, p. 6), as follows:

$$(\sqrt{ht})^{\phi} = \delta + \alpha(|\varepsilon t-1| + \gamma\varepsilon t-1)^{\phi} + \beta(\sqrt{ht-1})^{\phi} \quad .$$

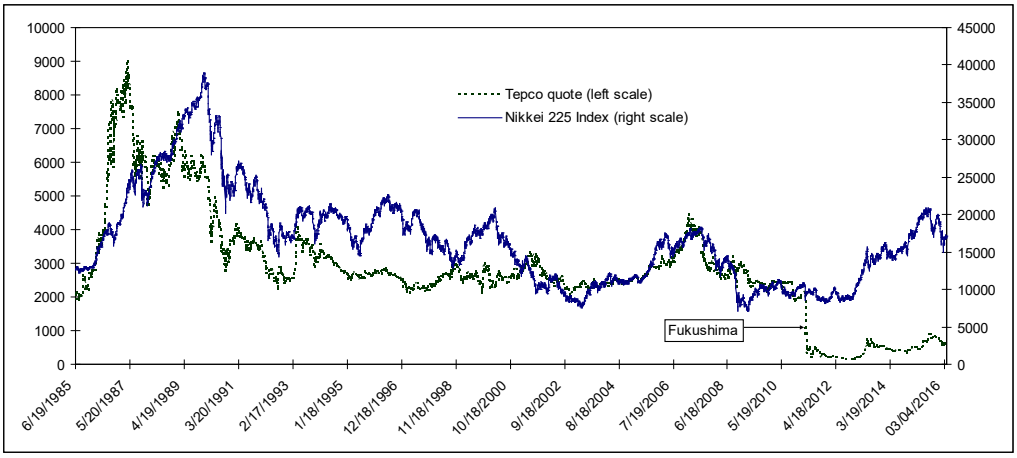
It can be reduced, for example, to GARCH(1,1) for $\Phi=2$ and $\gamma=0$, to GJR-GARCH for $\Phi=2$ and $0\leq\gamma\leq1$, and to TGARCH for $\Phi=1$ and $0\leq\gamma\leq1$.

2.2 Data

We studied stock returns and volatility for both TEPCO and the Nikkei 225 daily over a 30-year period (19 June 1985 to 29 March 2016), which produced 8017 stock or index prices. We start the analysis in 1985, because it was the year of the Plaza agreement, in which G5 countries decided to depreciate the U.S. dollar against the Japanese yen and Deutsche mark, to benefit U.S. exports through lower prices. The financial and stock market data come from the International Factset database.

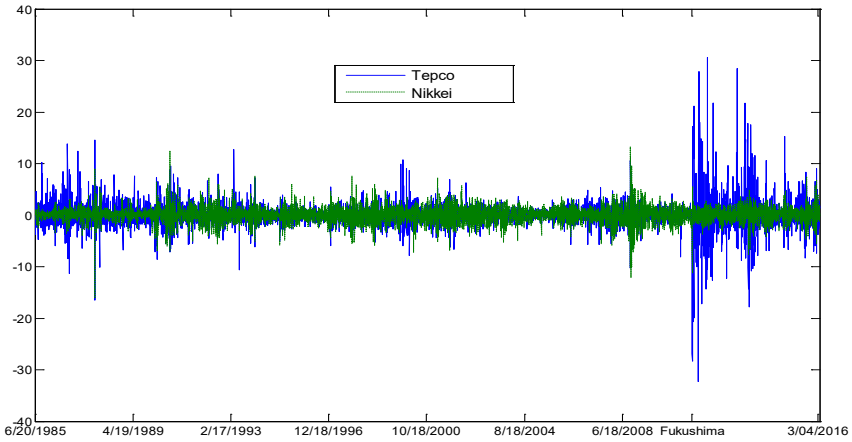
As Figure 1 reveals, the long-term Nikkei 225 index and TEPCO stock prices both exhibit huge variations between 1985 and 2016. Some economic or financial shocks are evident (e.g., 1987 market crash, Gulf War, real estate bubble burst in the early 1990s, Internet bubble burst in 2000s, subprime crisis of 2008, Fukushima earthquake of 2011). The Nikkei has not regained its 1990 high (more than twice its 2016 level); a similar pattern marks TEPCO's trends until the Fukushima disaster, after which TEPCO's stock price level fell to less than 5% of its highest value in 1987.

Figure 1 TEPCO and Nikkei 225 index: historical prices



Considering the main events that have affected both TEPCO and the Nikkei 225 in the past 30 years, the 2011 earthquake is critical, but different categories of events also have been influential, such as international political crises, international financial shocks, and events specific to the Japanese economy, including a stock market crash in 1987, real estate crisis in 1990, the bursting of the dot.com bubble in 2000, the international subprime crisis in 2008, and various political or financial scandals in Japan (e.g., Toshiba financial fraud in 2008–2014). Each of these shocks could constitute good or bad news, so we study the amplitude and persistence of the effects of positive or negative information on company returns and volatility. Just as the effects of minor or major events may differ, the impact of positive or negative information might not be symmetric or match in their duration. The descriptive statistics for the daily stock returns reveal that at the industry level, the daily returns Rt are defined by Rt = 100.ln(Pt /Pt-1), where P is the stock price or market index. In Figure 2, the largest daily returns of the Nikkei 225 occur during the 2008 subprime crisis; index variations during the Gulf War in 1990 were the second largest. For TEPCO, the largest returns (mostly stock declines) happened in the weeks after the Fukushima earthquake and continued for a few years. The only other period with similarly notable price variations for this company was the aftermath of the 1987 crash.

Figure 2 Daily returns for TEPCO and the Nikkei 225



The descriptive statistics in Table 1 detail the return characteristics for TEPCO stock prices and the NIKKEI 225 index.

Table 1 Descriptive statistics of stock returns over 1985–2016

	TEPCO	Nikkei 225
Mean	-0.015454	0.003642
Median	0.000000	0.000000
Maximum	30.61160	13.23460
Minimum	-32.32730	-16.13540
Standard Deviation	2.387334	1.445844
Skewness	0.344394	-0.287542
Kurtosis	35.49625	11.07418
Jarque-Bera	352864.5	21884.74
Probability	0.000000	0.000000

These patterns thus differ somewhat. Whereas the median return is 0 for both, the mean value is -0.0154 for TEPCO and 0.0036 for the Nikkei. In the long run, the standard deviation in TEPCO stock is far greater than that exhibited by the Nikkei index. The difference is even more notable in the kurtosis, such that TEPCO (35.49) experienced many larger price variations than the index. Moreover, the return distributions are not symmetric, with slightly more positive returns for TEPCO but more negative ones for the Nikkei. Therefore, both return distributions include fat tails; as confirmed by the high values of the Jarque-Bera statistics, these patterns do not fit a Gaussian distribution (i.e., the normality hypothesis is rejected at a 0.001% error level). This result is fairly common in international market returns (Cont, 2001), but in the Japanese context, it also is interesting to consider volatility processes more closely. For example, autocorrelations might signal momentum effects, as suggested for TEPCO by Jaussaud et al. (2015).

3. Estimation of volatility models

Considering the ARCH effects, with a 10-day lag, both the TEPCO and Nikkei 225 returns exhibit significant values (Table 2). The TR^2 and F-statistics are significant at the 0.1% error level, indicating that the null hypothesis (i.e., no ARCH effect) can be rejected for both series. Engle (1984, p. 802) asserts that the Lagrange multiplier test can "be written in terms of the residuals from the estimate under the null. Thus, it provides a way of checking the residuals for non-randomness." For each alternative model we test, we will obtain a specific type of non-randomness.

Table 2 ARCH effects tests

Stock Return					
	Lags	$LM = T.R^2$	p-value	F-Statistic	p-value
TEPCO	10	1512.66	0.000	186.24	0.000
Nikkei 225	10	1129.86	0.000	131.37	0.000

Table 3 details the parameters of the various GARCH models for the Nikkei index. The best log-likelihood value results from an APGARCH model, though the other GARCH models offer similar log-likelihood values. In turn, we assert that the simple GARCH provides a good fit to volatility trends, but the other types offer slightly more precise modelling. With regard to TEPCO's historical volatility, the situation is fairly similar (see Table 4) The simple GARCH model again offers a good fit, but APGARCH is more precise. Whereas GJR-GARCH provides the smallest improvement over the basic GARCH model for the Nikkei, TGARCH exhibits a lower log-likelihood value than the basic GARCH for TEPCO. Accordingly, the threshold effect is not relevant for TEPCO, and the standard deviation of its volatility does not depend on absolute large innovations, despite the obvious influence of some major shocks. For the Nikkei, we conclude that large negative changes do not tend to be more clustered than positive changes.

Table 3 GARCH models for the Nikkei

Model	δ	α	β	γ	Power term		Log-likelihood
GARCH	0.0188 (0.00)	0.0927 (0.00)	0.9065 (0.00)				-12980.84
EGARCH	0.0209 (0.00)	-0.0969 (0.0)	0.9767 (0.00)	0.1607 (0.00)			-12896.82
TGARCH	0.0279 (0.00)	0.1425 (0.00)	0.9163 (0.00)	-0.1132 (0.00)			-12896.77
GJR-GARCH	0.0278 (0.00)	0.15851 (0.00)	0.8995 (0.00)	-0.1275 (0.00)			-12915.32
PGARCH	0.0174 (0.00)	0.0975 (0.00)	0.9147 (0.00)		1.4603 (0.00)		-12973.52
APGARCH	0.0279 (0.00)	0.0857 (0.00)	0.9132 (0.00)	**-0.6043** **(0.00)**	1.2009 (0.00)		**-12894.3**
NGARCH	-0.0087 (0.18)	0.0946 (0.00)	0.8878 (0.00)	0.7463 (0.00)			-12907.9

Table 4 GARCH models for TEPCO

Model	δ	α	β	γ	Power term		Log-likelihood
GARCH	0.0561 (0.00)	0.1484 (0.00)	0.8631 (0.00)				-14745.18
EGARCH	0.0593 (0.00)	-0.0351 (0.00)	0.9772 (0.00)	0.2676 (0.00)			-14731.14
TGARCH	0.0345 (0.00)	0.1671 (0.00)	0.8870 (0.00)	-0.0467 (0.00)			-14750.02
GJR-GARCH	0.0549 (0.00)	0.1975 (0.00)	0.8620 (0.00)	-0.0873 (0.00)			-14731.82
PGARCH	0.0463 (0.00)	0.1522 (0.00)	0.8732 (0.00)		1.5836 (0.00)		-14739.5
APGARCH	0.0477 (0.00)	0.1543 (0.00)	0.8700 (0.00)	**-0.1466** **(0.00)**	1.6594 (0.00)		**-14728.42**
NGARCH	0.0495 (0.00)	0.1505 (0.00)	0.8602 (0.00)	0.2729 (0.00)			-14737.35

According to the log-likelihood statistics, the APGARCH(1,1) model offers the best fit to the data. In this model, the large negative values of the γ coefficient indicate that the market responds with more volatility to bad news in returns (decreases) than it does to good news in returns (increases). The results we obtain align with standard findings in financial literature, in that the power term Φ is less than 2 (Bollerslev, 2008) but significantly greater than 1 for both PGARCH and APGARCH, for the Nikkei and TEPCO. Therefore, the power model is relevant, particularly for TEPCO, for which the impacts of unexpected price components were substantial in the years following the Fukushima accident. For both return series, we also note that the γ values are negative for TGARCH, GJR-GARCH, and APGARCH but positive for EGARCH and NGARCH, confirming the stronger impact of negative (relative to positive) unexpected variations on price volatility.

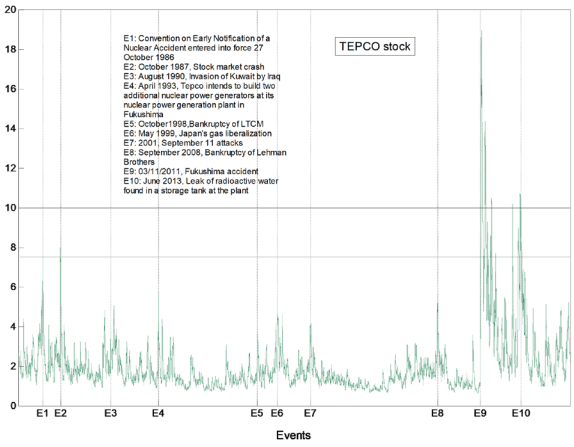
4. Volatility and main events that affect TEPCO or the Nikkei

In this section, we focus on the standard deviation of TEPCO and the Nikkei index, based on APGARCH model estimates. We analyse switches in volatility, according to key events at the international level and in Japan. Appendix 1 lists these events.

4.1. Major highs and lows in TEPCO stock returns over the past 30 years

We surveyed major events (Appendix 1) that could influence the volatility of TEPCO stock. We also note the main periods of high volatility for TEPCO over the past 30 years. The APGARCH(1,1) model (Figure 3) displays the situation clearly, similar to the other models (e.g., TEPCO PGARCH(1,1) in Appendix 3).

Figure 3 TEPCO APGARCH(1,1) standard deviation and main events



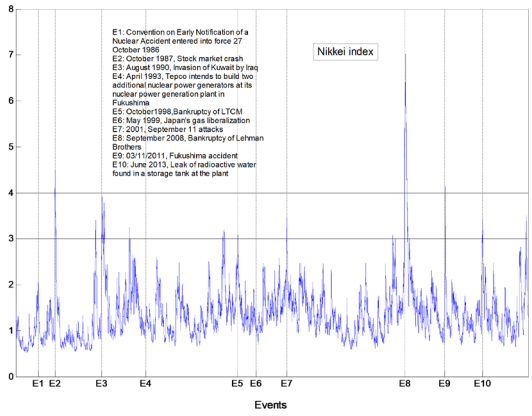
The period marked by the highest volatility for TEPCO was the post-Fukushima period, which lasted several months after 11 March 2011, spanning into 2012 and 2013. This environmental and industrial catastrophe boosted TEPCO's return volatility by more than 5 times, relative to its usual long-term value. No other event had similar effects on stock volatility over the past 30 years. However, another high volatility event involved the October 1987 stock market crash, which impaired nearly all companies worldwide. It increased the volatility level up to 3 times the usual long-term value. A third high volatility event, in summer 1986, increased TEPCO stock by about 20% between July and

the end of October, following the Chernobyl accident in April 1986 and the adoption in September 1986 of the *Convention on Early Notification of a Nuclear Accident* to establish a rating system and requirements for data reporting (time, location, radiation). This convention entered into force on October 27, 1986. Other events exert smaller impacts on volatility. For example, the September 2001 attacks in New York prompted an increase in volatility, as did the Gulf War. Financial shocks following the bankruptcies of Long Term Capital Management (LTCM) in 1998 and Lehman Bothers in 2008 generated high volatility. At firm level, the construction of two nuclear generators by TEPCO in 1993, as well as reports in June 2013 of important leaks of radioactive water, created uncertainty and stronger volatility. With regard to nuclear, environmental, and safety issues since 1993 (see Appendix 5), the Fukushima catastrophe had the most severe impacts on TEPCO's return volatility. Even the 1993 Hokkaido earthquake and 1995 Kobe earthquake did not create significant or long-term volatility changes, for either TEPCO or the Nikkei index. Considering nuclear activity by TEPCO, security issues arose in May 2002 (inquiries about misconduct in inspections and repairs between 1986 and 2001), October 2002 (reports of leaks in the primary containment vessel at Fukushima Daiichi), and March 2004 (TEPCO admitted a series of misconducted inspections and reports about cracks in Fukushima Daiichi). A weak market reaction also followed the Niigata Chuetsu Oki earthquake (west of Fukushima) in July 2007, despite damages to TEPCO's Kashiwasaki-Kariwa nuclear power plant. After the Fukushima earthquake in March 2011, numerous press accounts of safety failures and noncompliance in nuclear plants caused the high volatility level of stock returns to persist for several years.

4.2. Major highs and lows in the Nikkei 225 returns

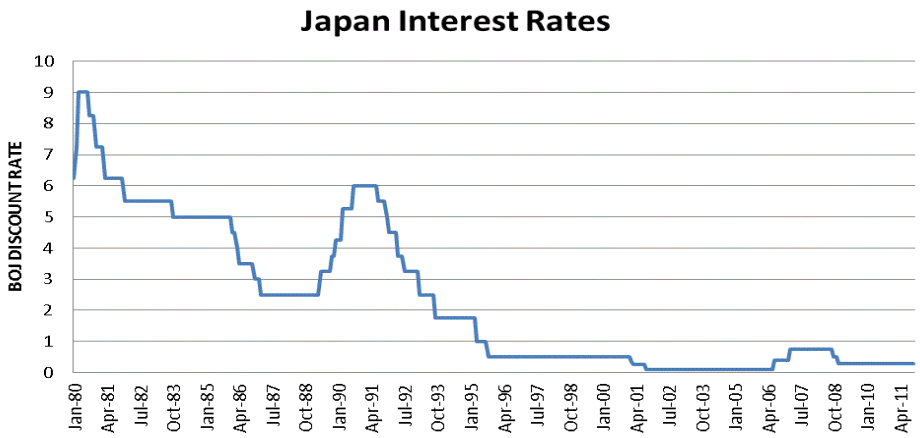
We studied the highs and lows of the Nikkei index's volatility, measured by the standard deviation derived from the APGARCH(1,1) (Figure 4). In considering the main political and economic events that affect its volatility, we also offer a comparison with the results for TEPCO. Specifically, for the Nikkei index, the main event is the subprime crisis following the Lehman Brothers bankruptcy on 15 September 2008. Volatility began to increase a few days before this announcement and reached a climax (about 3 times its usual long-term value) in mid-October 2008. It took about six months for volatility to return to its pre-crisis level. A second volatility peak was caused by "black Monday," October 19, 1987, when stock markets crashed worldwide, though its span lasted only about a month and a half. Only during the four highest volatility periods did the Nikkei index's volatility reach a level higher than twice its usual value.

Figure 4 Nikkei APGARCH(1,1) standard deviation and main events



A third high volatility period occurred during the second half of 1990, reflecting two pertinent events. On 2 August 1990, Iraq's invasion of Kuwait triggered the first Gulf War, which increased volatility across world markets. In addition, an internal crisis took place in Japan, leading to a real estate collapse: On 2 October 1990, the Bank of Japan tightened its monetary policy and increased the official discount rate from 4.25% to 6.00%. Thereafter, the rates decreased in the long run (Figure 5).

Figure 5 Japan's interest rates in percent



Source: https://housingjapan.com/2011/11/10/a-history-of-tokyo-real-estate-prices/

Meanwhile, the Japanese yen (JPY) dropped to 158 JPY per U.S. dollar (USD) in April 1990, then bounced back to 129 JPY/USD in November. As a consequence, the Nikkei 225 decreased from 37,189 at the beginning of January to 23,849 on 3 December 1990. This index has not surpassed 21,000 again in the subsequent 26 years. After the 1982–1990 bubble, real estate prices also began to collapse in 1992 (Figure 6).

Figure 6 Land prices for commercial property in the Ginza-Chome 7, per square meter

Source : https://housingjapan.com/2011/11/10/a-history-of-tokyo-real-estate-prices/

A fourth volatility shock came from the Fukushima earthquake. For the index, this catastrophe did not have a long-lasting impact on volatility, because fears of a national economic collapse quickly disappeared. The main consequences instead centred on the electric power industry, and TEPCO activity specifically. We find another shock by the bankruptcy of the Long-Term Credit Bank on 7 October 1998. Over three days, the Nikkei's volatility level reached 10% of its highest values. Finally, a comparison of the positive innovations in the volatility process of TEPCO and the Nikkei index returns does not indicate a high correlation (0.26). When we consider negative innovations, the correlation is slightly higher (0.32), due to the absence of symmetry in the amplitude changes. Therefore, bad news tends to affect TEPCO more frequently but the Nikkei in the same way as good news.

5. Regime switching and the relationship between TEPCO and the Nikkei index

Generally, a diversification strategy depends on the degree of correlation among stocks or between stocks and the market. Therefore, we consider correlations between the volatilities, as well as the relationship of the returns for TEPCO and the Nikkei index. Our observations of the volatilities reveals two key characteristics. First, for the overall study period and also after the earthquake, the market responses for TEPCO and the Nikkei differ. Second, we observe asymmetric responses to shocks (GARCH estimations) and alternations between high and low volatility periods (Figures 1 and 2). To account for these characteristics, we adopt a regime-switching/Markov-switching model that we use to estimate conditional correlation between TEPCO and the Nikkei, as well as to estimate the relationship between their returns.

The main characteristic of a Markov-switching model is that the transitions between the regimes or states $st \in \{= 1,K,M\}$ are governed by a Markov chain. The transition probability from a state j to a state i is

$$p_{ij} = \Pr(s_{t+1} = j \mid s_t = i), with \sum_{j=1}^{M} p_{ij} = 1 \; \forall i,j \in \{1,K,M\} \tag{2}$$

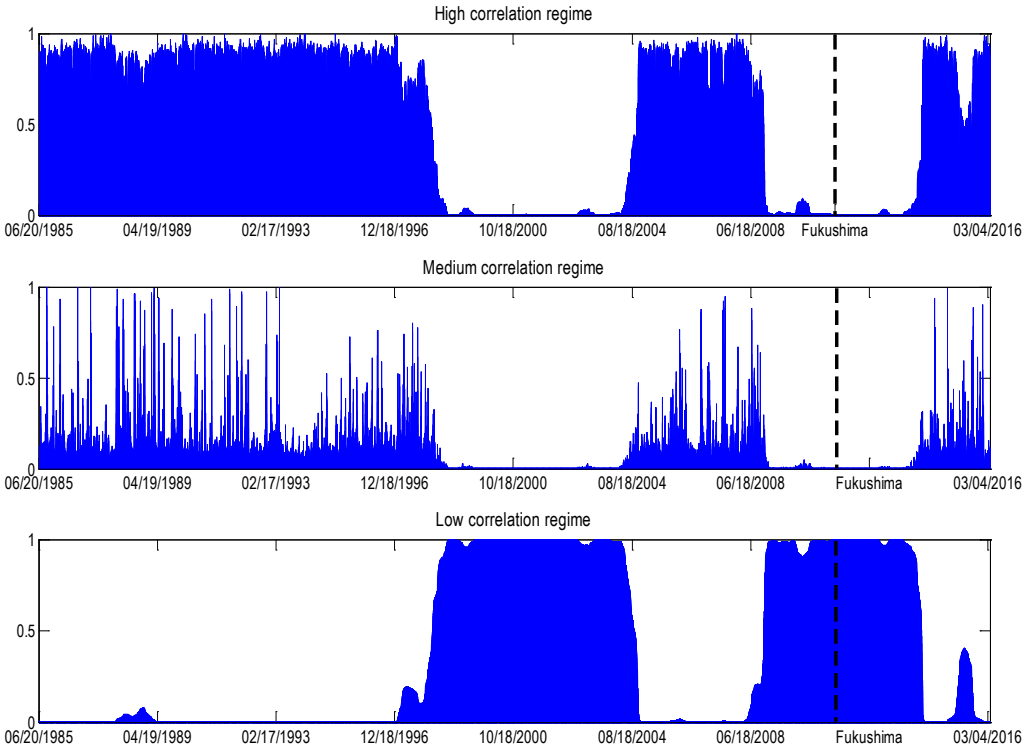
We do not analyse regime switching in TEPCO stock separately from that in the Nikkei index, but we consider regime switching in the conditional correlations and the relationships between both TEPCO returns and Nikkei returns.

5.1 Regime-switching dynamic correlation

To address the potential conditional correlation of TEPCO stock with the Nikkei, we use the regime-switching dynamic correlation model of Pelletier (2006).[1] Consider a K-variate process, $Y_t = H_t^{1/2} U_t$, where U_t is an i.i.d $(0,I_K)$ process; the time-varying covariance matrix H_t can be written as $H_t = S_t \Gamma_t S_t$, such that Γ_t contains the correlations, and S_t is a diagonal matrix of the standard deviations. We note three states, marked by low, intermediate, and high conditional correlations. In analysing the regime-switching correlation model with three states (Figure 7), we find that the high correlation regime is the most frequent for TEPCO over the past 30 years.

[1] See also the discussion of these models by Billio and Caporin (2005).

Figure 7 Smoothed probabilities of the three-regime model (TEPCO and Nikkei 225)



The momentum effect is more frequent than the mean-reverting effect among return patterns. The medium correlation regime is not very frequent; the low correlation regime is even less frequent. We identify two periods in which the low correlation regime dominated though: between 1997 and 2004 and between 2008 and 2014. The first includes the Long-Term Credit Bank failure and the Internet bubble burst effects; the second begins with the subprime crisis and includes the Fukushima catastrophe.

5.2 MS-VAR analysis

We also investigate the relationships between TEPCO's stock and the Japanese market index. Both TEPCO and Nikkei returns satisfy the stationary condition.[2] We start by analysing the relationships between endogenous variables using a vector autoregressive (VAR) approach (Sims, 1980), but "if the time series are subject to shifts in regime, the stable VAR model with its time invariant parameters might be inappropriate" (Krolzig, 1997, p. 11). In that case, a Markov switching VAR is preferable. The general idea behind this MS-VAR model is that the parameters of the underlying

data-generating process of the observed time-series vector y_t depend on an unobservable regime/state variable *st.* For this study, the MS-VAR process (*MS(M)-VAR(p)*) contains *s* states and *p* lags, as given by

[2] To save space, we do not present the unit root tests here; they are available on request.

$$y_t = \delta(s_t) + A_1(s_t)\, y_{t-1} + \mathsf{K} + A_p(s_t)\, y_{t-p} + \varepsilon_t, \qquad \varepsilon_t / s_t \sim NID(0, \sum(s_t)), . \quad (3)$$

For the empirical application, $y_t = (R_t^{tp}, R_t^{nk})'$, using *tp* to indicate TEPCO and *nk* for Nikkei. For an *s* state and $p = k$, Equation (3) can be written as

$$\begin{aligned} R_t^{tp} &= \delta^{tp}(s_t) + \sum_{k=1}^{p} a_{k(S_t)}.R_{t-k}^{tp} + \sum_{k=1}^{p} a_{2k(S_t)}.R_{t-k}^{nk} + \sigma_{(S_t)}.\varepsilon_t^{tp} \\ R_t^{nk} &= \delta^{nk}(s_t) + \sum_{k=1}^{p} b_{1k(S_t)}.R_{t-k}^{tp} + \sum_{k=1}^{p} b_{2k(S_t)}.R_{t-k}^{nk} + \sigma_{(S_t)}.\varepsilon_t^{nk} \end{aligned} \quad (4)$$

where $\sigma_{(S_t)}$ is regime-specific volatility.
Considering three states $s_t = 1,2,3$ and two lags, the MS(3)-VAR(2) features switches in the coefficients of the variables and in the intercepts (δ). We present the results in Table 5. For the parameter estimation, we use the maximum likelihood method.

Table 5 MS(3)-VAR(2) estimation results

Model	**Regime 1**		**Regime 2**		**Regime 3**	
	Rtepco	Rnikkei	Rtepco	Rnikkei	Rtepco	Rnikkei
δ(s)	-0.01 (0.99)	-0.01 (0.99)	-0.001 (0.99)	0.001 (0.99)	-0.001 (0.99)	-0.001 (0.99)
$a_{11(s)}$	-0.01 (0.29)		-0.01 (0.99)		0.11** (0.00)	
$a_{12(s)}$	0.03 (0.99)		-0.04** (0.03)		0.08** (0.01)	
$a_{21(s)}$	-0.07** (0.00)		-0.02 (0.99)		-0.07** (0.02)	
$a_{22(s)}$	-0.01 (0.99)		0.01 (0.99)		-0.02 (0.99)	
$b_{11(s)}$		-0.02 (0.99)		-0.01** (0.04)		0.001 (0.99)
$b_{12(s)}$		0.001 (0.99)		0.01 (0.99)		-0.001 (0.99)
$b_{21(s)}$		-0.05** (0.00)		0.07** (0.00)		-0.07 (0.99)
$b_{22(s)}$		-0.04** (0.00)		0.06** (0.00)		-0.04 (0.02)
Duration	37.20		10.05		3.81	
V(S)	0.968**	1.526**	2.451**	0.547**	27.95**	6.928**
Transition Probability Matrix *P*						
Regime 1	0.97**		0.01**		0.08**	
Regime 2	0.00**		0.90**		0.19**	
Regime 3	0.03**		0.09**		0.74**	
** and * denote rejection of the null hypothesis at the 0.05 and 0.10 levels, respectively.						

Both TEPCO and Nikkei returns signal regime shifts in volatilities. Regime 1 is characterized by a low TEPCO volatility (0.968) and a limited Nikkei volatility (1.426). Regime 2 features a low Nikkei volatility and higher TEPCO volatility. Regime 3 contains high volatilities. Thus, they represent a low volatility regime (State 1), intermediate volatility regime (State 2), and high volatility regime (State 3). Regime 1 exhibits the longest average duration, of 37.2 days. Susmel (2000) offers a similar result for weekly exchange rates in Canada and the United States in the 1980s. Conversely, the duration of Regime 2 is just 10 days, and the high volatility state has the shortest duration, of 3.8 days.

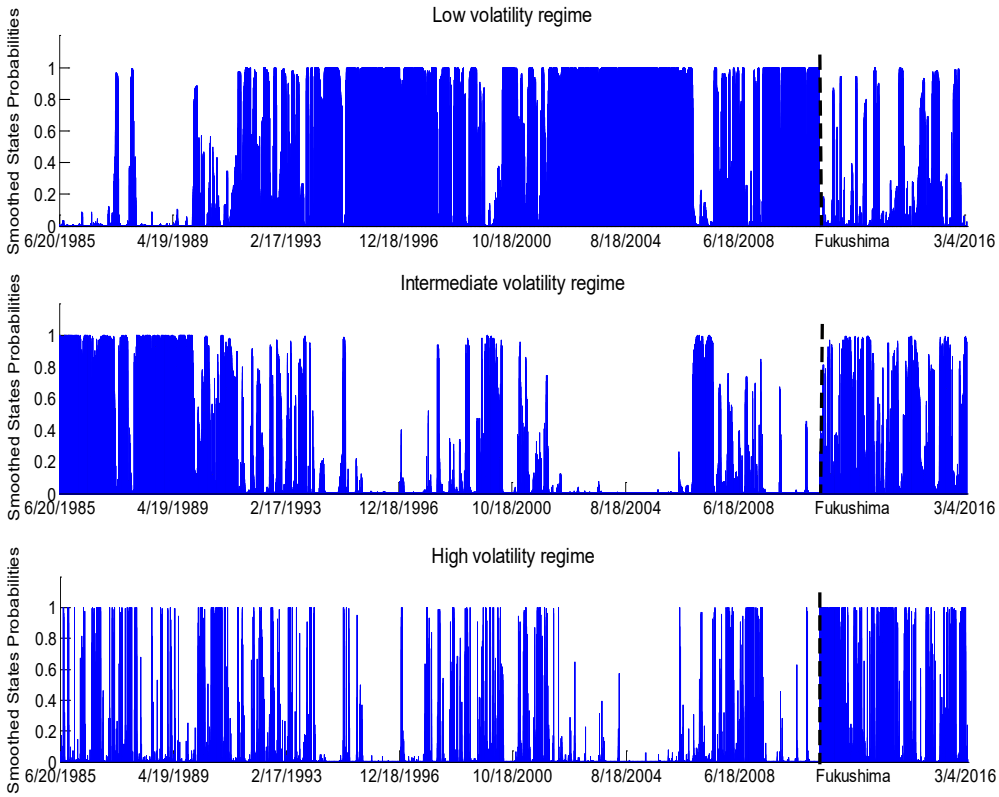
These observations may be complemented by a consideration of the transition probabilities across different regimes.

The transition probabilities matrix P can be defined as $P = \begin{bmatrix} & s1 & s2 & s3 \\ s1 & p_{1,1} & p_{1,2} & p_{1,3} \\ s2 & p_{2,1} & p_{2,2} & p_{2,3} \\ s3 & p_{3,1} & p_{3,2} & p_{3,3} \end{bmatrix}$, where $p_{i,j}$ is the probability of switching from state j (column j) to state i (row i). Regime 3, which essentially reflects the Fukushima crisis, is less persistent than the two other regimes. Regime 1 shows a very low switching probability (Table 5). We also identify a strong interaction between Regimes 2 and 3, whereas Regime 1 is a low volatility, self-standing regime (Gallo and Otranto, 2013). Even if TEPCO's stock volatility remained higher than usual after the Fukushima disaster, the high volatility regime progressively switched to more moderate volatility over the subsequent few months.

In Regimes 1 and 3, we also find a significant, negative effect of the Nikkei returns on TEPCO's returns. However, TEPCO's returns do not influence the Nikkei returns. The causality relationship reverses in Regime 2, but the negative coefficient is lower in absolute value. In Appendix 4, we provide complementary estimations for a model with four regimes, and the conclusions are similar, such that in three regimes, the Nikkei returns "cause" TEPCO's returns, and at a 0.05 significance level, TEPCO's return "do not cause" the Nikkei return in any regimes. Therefore, the results confirm that TEPCO plays a limited role in determining the Japanese stock market, even during a massive crisis. In contrast, TEPCO's returns depend strongly on the wider market.

Figure 8 contains a chart of the smoothed probability of each state. During 1985–2016, we observe contrasting situations. Regime 1 dominates after 1990 until the Fukushima catastrophe. Except for the collapse of the dot.com bubble and the subprime crisis, this period remains "normal" and relatively stable. The intermediate regime mainly appears during the Japanese bubble in the 1980s and the two previous episodes of crisis. Regime 3 implies episodes of very high volatility, including the Japanese stock market crash but mostly after the earthquake that generated such substantial volatility in the TEPCO stock and that persisted up to five years later.

Figure 8 Smoothed probabilities in the MS(3)-VAR(2) model



6. Conclusion

This study highlights several interesting features pertaining to the long-run returns and volatility of TEPCO's stock and the Nikkei 225 index. For 1985–2016, we can reject the null hypothesis of no ARCH effect, which led us to examine which GARCH model provides the best fit to describe volatility for both TEPCO and the Nikkei. The simple GARCH model offers a good fit; the APGARCH is slightly more precise. However, the TGARCH model does not appear relevant for TEPCO, indicating that the standard deviation of its volatility does not depend on absolute large innovations, despite a clear impact of the major shocks. For the Nikkei, we also can conclude that large negative changes do not tend to be more clustered than positive changes.

In the APGARCH(1,1) model, large negative values of the γ coefficient indicate that the market responds with much more volatility to bad news in returns (decreases) than it does to good news in returns (increases). Thus we can conclude that the power model is relevant, particularly for TEPCO, because the impact of the unexpected price components remained fairly substantial in the years following the Fukushima accident.

When we analyse the regime-switching correlation model with three states, we determine that the high correlation regime is the most frequent for TEPCO; thus, the momentum effect has been more frequent than the mean-reverting one. A low correlation regime dominated during just two

periods: 1997 to 2004 (i.e., failure of Long-Term Credit Bank and Internet bubble burst) and 2008 to 2014 (subprime crisis and Fukushima catastrophe).

Both TEPCO and Nikkei returns satisfy stationary conditions, and they exhibit regime shifts in their volatilities. Regime 1 involves low TEPCO volatility and limited Nikkei volatility, Regime 2 features low Nikkei volatility and higher TEPCO volatility, and Regime 3 indicates high volatilities, mainly related to the Fukushima crisis, such that it is less persistent than the other two regimes. Regime 1 instead tends to remain in place and self-contained, whereas we uncover some strong interactions between Regimes 2 and 3. Yet in Regimes 1 and 3, we note that the Nikkei exerts a significant, negative effect on TEPCO's returns, though the opposite is not true. Overall, our results show that TEPCO exerts limited influence on the Japanese stock market, even during crisis events, whereas the market largely defines TEPCO's returns.

These results pertaining to the returns, volatilities, and causal relationships between the Nikkei index and TEPCO's stock contribute to a better understanding of the long-run volatility process that appears in these series. Thus, the findings may help investors make better informed investment choices, related to assets or volatility, to generate more abnormal positive returns or adjust the risk–return balance in their portfolios. The economic and industrial crises that TEPCO has experienced over the past 30 years, among which Fukushima was the most notable, have led the company to enter a transition era. This transition will influence the market valuation and volatility of TEPCO's stock, but it also may affect the electric power industry as a whole, especially as renewable energies come to have a larger role in Japan's future energy policies.

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APPENDIX 1. Political and economic events, 1985–2016

E1: Following the Chernobyl nuclear plant accident (April 2016), the General Conference of the International Atomic Energy Agency in a session in Vienna on September 24–26, 1986, adopted the Convention on Early Notification of a Nuclear Accident. It established a notation system that requires states to report all data (time, location, radiation) necessary to assess crisis situations. It entered into effect on October 27, 1986.

E2: October 1987 stock market crash. On Black Monday, October 19, stock markets around the world crashed.

E3: August 1990, invasion of Kuwait by Iraq.

E4: April 1993, TEPCO announces plans to build two additional nuclear power generators at its nuclear power generation plant in Fukushima.

E5: October 1998, bankruptcy of LTCM.

E6: May 1999, Japan's gas sector liberalization.

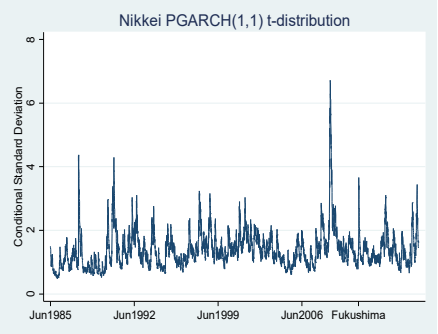
E7: 2001, September 11 attacks.

E8: September 2008, bankruptcy of Lehman Brothers.

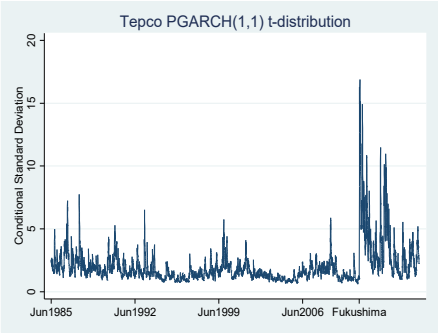
E9: 2011, Fukushima accident on March 11.

E10: June 2013, leak of radioactive water found in a storage tank at the plant. TEPCO announced a leak of 300 tons of highly radioactive water.

APPENDIX 2. Nikkei PGARCH(1,1)



APPENDIX 3. TEPCO PGARCH(1,1)



APPPENDIX 4. MS(4)-VAR(2) model

Model								
	Regime 1		Regime 2		Regime 3		Regime 4	
	Rtepco	Rnikkei	Rtepco	Rnikkei	Rtepco	Rnikkei	Rtepco	Rnikkei
δ(s)	0.001 (0.99)	0.01** (0.01)	-0.001 (0.99)	0.01 (0.99)	-0.06** (0.05)	0.01 (0.99)	0.03 (0.99)	-0.01 (0.99)
$a_{11(s)}$	-0.07 (0.99)		0.03 (0.99)		0.01 (0.99)		0.14** (0.00)	
$a_{12(s)}$	0.03** (0.00)		-0.05 (0.99)		-0.01 (0.99)		-0.11** (0.00)	
$a_{21(s)}$	-0.05 (0.99)		**0.04**** **(0.04)**		**-0.11**** **(0.00)**		**0.18**** **(0.00)**	
$a_{22(s)}$	-0.001 (0.99)		-0.001 (0.99)		-0.02 (0.99)		-0.001 (0.99)	
$b_{11(s)}$		0.03 (0.99)		0.02 (0.99)		0.01 (0.99)		0.001 (0.99)
$b_{12(s)}$		-0.001 (0.99)		0.001 (0.99		0.01 (0.99)		**0.001*** **(0.09)**
$b_{21(s)}$		-0.05 (0.99)		0.08** (0.00)		-0.10** (0.00)		0.06 (0.99)
$b_{22(s)}$		0.03 (0.99)		0.07** (0.00)		-0.08** (0.00)		-0.12** (0.00)
Duration	7.92		16.96		6.42		3.77	
V(S)	0.471**	0.842**	2.789**	0.412**	2.633**	2.743*	46.12**	7.856**
	Transition Probability Matrix *P*							
Regime 1	0.87**		0.00		0.12**		0.01**	
Regime 2	0.00		0.94**		0.00		0.11**	
Regime 3	0.13**		0.00		0.84**		0.15**	
Regime 4	0.00		0.06**		0.04**		0.73**	

** and * denote rejection of the null hypothesis at the 0.05 and 0.10 levels, respectively.

Here ends the Second part of the Special Japan Issue.

The first part can be found in the Journal Global Policy and Governance, Volume 6 Number 2, both in printed and online version.

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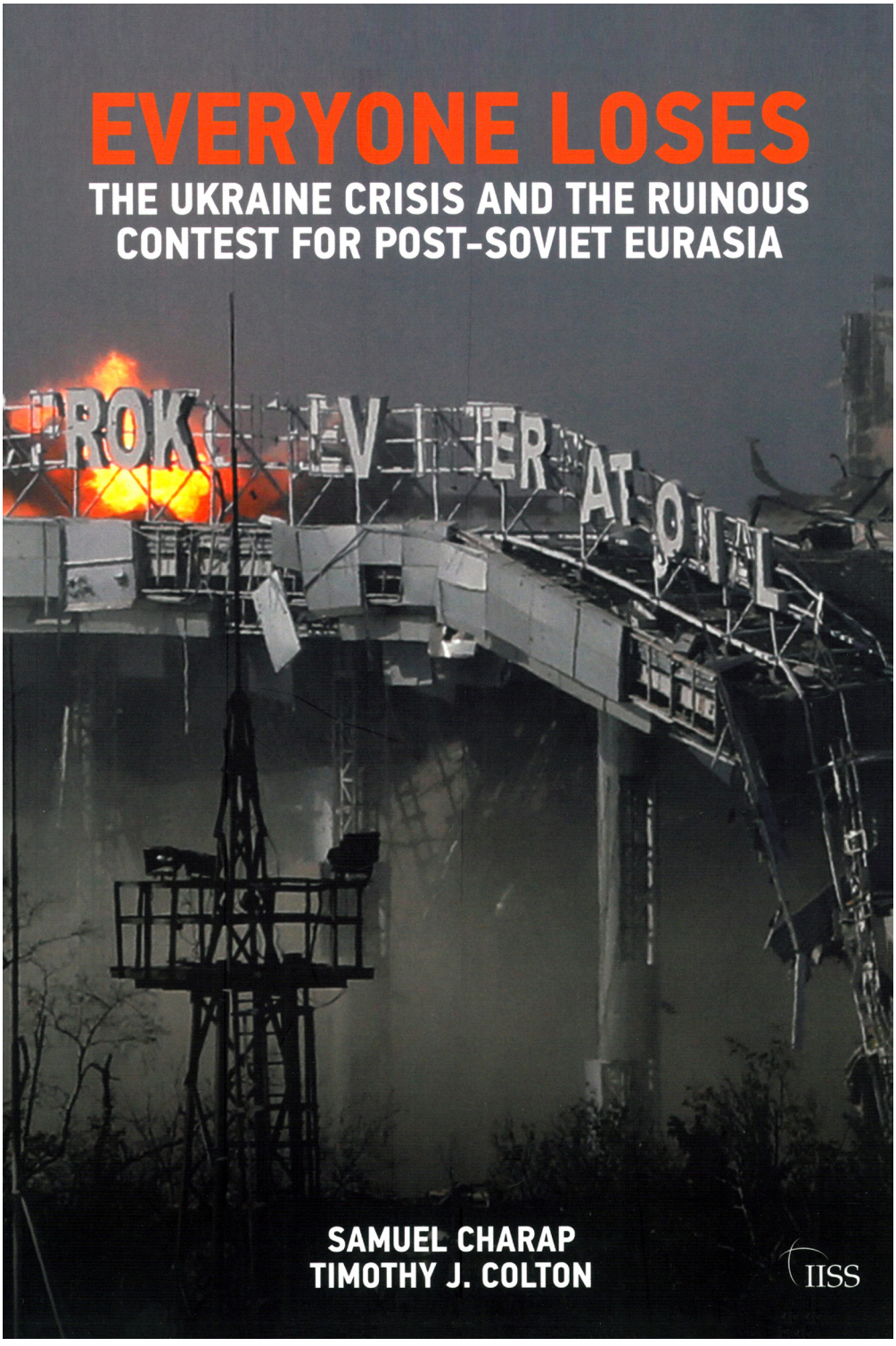
THE UKRAINE CRISIS AND THE RUINOUS CONTEST FOR POST-SOVIET EURASIA



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IISS

JTSR (2017) 24: 65-81
DOI 10.14665/1614-4007-24-2-006

PAPER

Firm Heterogeneity, Location and Export Performance Empirical Evidence from Ukrainian Firm-Level Data

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Abstract This paper studies export performance of Ukrainian firms using the unique micro-level dataset for the years 2005 and 2013. We estimate probit regressions for pooled dataset for all years as well as for specific years of our sample. In addition, we distinguish between manufacturing and service sectors. Our empirical results show the positive link between the export status and total factor productivity, competition in the industry, firm size, capital intensity, ownership status, and foreign sourcing (imports). Moreover, firms located in Western part of the country are found to be more export-oriented compared to firms located in other regions.

Keywords Export activity, productivity, regions, Ukraine.

JEL Classification F14, P33

Introduction

After the collapse of the Soviet Union in 1991 Ukraine emerged as an independent country and followed its own way of economic transition from central planning to a market economy. According to the World Bank Ukraine is classified as the lower-middle-income economy with post-communist past related to region of Commonwealth of Independent States. This way was different from the path followed by Central and Eastern European (CEE) countries which radically liberalized their multilateral and regional trade and integrated successfully with the European Union (EU).

However, compared to the new EU member states the Ukrainian transition resulted in relatively poor economic performance. The scope of economic and trade liberalization was significantly lower and structural and social reforms were less radical. The transformation eventually ended up with the market economy status that Ukraine obtained prior to joining the WTO on May 16, 2008. Nevertheless, the current macroeconomic situation in Ukraine is still characterized by the instability, a low level of financial development and considerable financial risk. The growth prospects are also not optimistic as shown by the recent think-tank reports such as CASE and Vienna Institute of International Studies.[1]

[1] Both institutions produced negative economic forecast for the war-torn country since the start of world financial crisis in 2008 (http://www.case-research.eu/en/node/58857 and http://wiiw.ac.at/how-to-

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The change in the political leadership and declarations for deeper economic reforms and signing the free trade agreement with the EU create new opportunities and prospects for economic recovery. In particular, increased integration with the EU facilitates the access of firms from Ukraine to foreign markets. The main goal of this paper is to study empirically the determinants of export performance of Ukrainian firms to see whether they are similar to those of the firms from the EU member countries, especially those that joined the EU in three subsequent waves of the Eastern Enlargement.

Therefore, in this paper we study empirically the nexus between total factor productivity and export performance of Ukrainian firms, having controlled for other firm characteristics. In addition, we compare the export performance of firms in manufacturing and services sectors located in different regions of Ukraine.

The structure of this paper is as follows. The next section summarizes the relevant literature. Then, we describe Ukrainian trade patterns and policy changes. In the following section we present the empirical methodology. Subsequently, we discuss the properties of the dataset. Then we present our empirical results. In the final section we summarize and conclude.

Literature review

The majority of previous studies for Ukraine evaluating the effects of trade liberalization were traditionally based on aggregate trade flows data and gravity models (Movchan et al., 2010; Shepotylo, 2009; Nasadiuk, 2012). More recently the attention in the empirical trade literature has switched from the country-level to the firm-level studies of the determinants of successful export performance. However, this kind of empirical evidence for Ukraine is still relatively scarce.

Up to now the literature on Ukrainian enterprises based on firm-level data focused on determinants of long-term productivity. For example, Pivovarsky (2003) analyzed the impact of ownership concentration on the firm performance in Ukraine. Earle et al. (2014), using the panel of 7000 manufacturing enterprises, demonstrated that political favoritism, in the context of weak institutions, can have substantial redistributional impact on economic productivity. Kostenko (2014) confirmed that innovation activity had a positive impact on labor productivity of Ukrainian firms. Yemelyanova (2014) analyzed the impact of ownership structure on the effectiveness of Ukrainian enterprises.

Most recently, Shepotylo and Vakhitov (2015) employed a large database of Ukrainian firms in 2001–07 to identify the effect of services liberalization on total factor productivity (TFP) of manufacturing firms. The results indicated that an increase in services liberalization was associated with an increase in TFP. The effect was stronger for firms with high productivity, bringing about a reallocation of resources within an industry. Industry-level results showed that the effect of reallocation on industry productivity was almost as strong as the within-firm effect. The dynamic interaction of services liberalization and TFP through the investment channel reinforced the effect of reallocation. In particular, it is more pronounced for domestic and small firms.

Kim et al. (2015) documented a variation across observed firms' characteristics, and the accompanying macroeconomic volatility, often related to political turmoil for Ukrainian manufacturing firms. They used an annual firm-level data for the period from 2001 to 2009 and employed functional principal component analysis. The overall improvements in firm productivity in Ukraine's manufacturing in 2001–2009 were found to vary substantially by industry, trade status and with firm turnover, while regional effects were less important. However, no attempts were made to study the relationship between productivity and export performance using Ukrainian firm level data. Following the latest strand in the trade literature that focuses

stabilise-the-economy-of-ukraine-n-83.html).

on firm heterogeneity, this paper contributes to the literature by analyzing the determinants of export performance of Ukrainian firms concentrating on the role of TFP. In contrast to the international trade literature which assumed that firms are symmetric the recent studies stress the firm heterogeneity in terms of productivity and its effect on export performance. In particular, Melitz (2003) argued that exporting is positively related to firm productivity.

A large number of empirical studies based on firm-level data compiled for many countries confirm this prediction. The existing empirical evidence shows that only a small fraction of the most productive firms are responsible for the majority of exports and most firms do not export at all concentrating their activities on domestic markets only. In particular, the positive link between foreign sales and productivity for the Baltic, Caucasus and Visegrad countries was confirmed in the recent study Cieślik, Michałek and Michałek (2014). First, they estimated probit regressions for the pooled dataset that included all three groups of countries, and then they disaggregated the sample into particular country groups to study the differences and similarities between these groups of countries. Their estimation results obtained for the whole sample indicated that the probability of exporting increases with the higher level of productivity and the measures of human capital, including the share of university graduates in total employment and spending on R&D activities. Moreover, the internationalization of the firms, proxied by the use of foreign technology licenses and the foreign ownership, was found to be positively related to the probability of exporting. Finally, they found that firm size was also a significant variable for the probability of exporting. These results were similar to the results presented in the EFIGE (2010) report obtained for the firms from the large EU countries. The estimation results obtained separately for specific country groups revealed a similar pattern in the case of the Visegrad countries and the Baltic states, although a smaller number of explanatory variables were statistically significant. However, in the case of the Caucasus countries only two explanatory variables were statistically significant: the firm size and the R&D variable, while the link between the level of productivity and the probability of exporting was not statistically significant. Thus, the firm size was the only explanatory variable which was statistically significant in the case of all groups of countries. This confirmed the importance of economies of scale for exporting.

Our study is based on the unique Ukrainian micro-level dataset for the years 2005 and 2013. In our study following the theoretical predictions of the Melitz (2003) model we devote special attention to the role of firm productivity in determining its export performance. In contrast to other studies for the CEE countries based on labor productivity we use TFP as a measure of overall productivity calculated by the Levinsohn-Petrin method. We are also able to distinguish between manufacturing and service firms and control for region-specific effects. In addition, we study the role of other firm characteristics such as internationalization measured by foreign capital participation and imported inputs. Finally, we able to control for firm size, capital-labor ratio, private ownership, and the level of market concentration in the industry.

Ukrainian macroeconomic and external trade context

Since the beginning of the 1990s Ukraine has been pursuing policies to transform its economy into market-oriented and open one. The lost decade in terms of economic growth of the 1990s was followed by 8 years of economic recovery in the 2001-2008 period disrupted by the economic and financial crisis. The further recovery did not materialize because of the unfavorable business policies of the Yanukovich government, political instability and military conflict which followed in 2014-2015. In 2014 Ukraine's GNI per capita amounted to USD3650 which was one of the lowest indicators in Europe (World Bank, 2015). At the same time it had one of the highest shares of shadow economy and tax evasion (IMF, 2015). The expected rate of inflation (46%

in 2015) is a characteristic of the country and was never brought down to low levels during the period of transition (IMF, 2015). Nowadays Ukraine is a service-based economy, since the share of services in GDP amounts to 63%, 25% - manufacturing and 12% - agriculture (World Bank, 2015). Accumulated human capital and presence of high value added industries (like aircraft-building) provide an opportunity to achieve better economic results.

The opening of the economy was one of the major reforms in the country. The liberal export and import regime of the 1990s allowed foreign competition. Increased competition in the internal market swept off many food, textile, durables and heavy industry enterprises, and restricted export capacities of Ukrainian companies. The export activity of the enterprises during the 1990s was determined by traditional comparative advantage sectors. This allowed an increase in exports of agricultural and raw materials of the newly opened Ukrainian economy. The exports of more advanced products have not been a strong component of Ukraine's economy. For example, in 2014 manufacturing and machine-building industries of the country (HS groups from 84 to 89) are quite modest exporters and constitute only 12% of the Ukrainian exports (Derzhkomstat, 2015).

The export activity of Ukrainian enterprises was motivated by i) the collapse of central planning and internal liberalization which allowed private enterprise and thus its interest in expanding abroad, ii) learning from importing as many enterprises could use imported components and iii) cooperation with foreign counterparts to create internationally competitive business environment in Ukraine (Havrylyshyn, 2007). The empirical application of the Melitz (2003) model can contribute to the better understanding of export behavior of the Ukrainian firms in the open market environment. Currently, in contrast to the central planning period, the export activity depends mostly on individual firm characteristics of Ukrainian enterprises.

One has to mention that Ukraine was a part of the value-added chains of the Soviet Union for over 70 years. This pattern is still leaving an imprint on the Ukrainian economy relations with the rest of the world. Ukraine's exports has been sent to major 3 destinations – Commonwealth of Independent States (CIS), European Union (EU) and Asia, while trade with Latin America and North America does not play an important role. The share of CIS countries has been traditionally large due to the long historical relations with the former Soviet Union republics. In 2014 the share of CIS in Ukrainian exports amounted to 32% while the share of EU countries – 31% of total Ukrainian exports.

The role of CIS countries has been increasing for the last 8 years due to ongoing trade liberalization with those countries, while the share of EU markets in total Ukrainian exports stagnated because of inter alia lack of trade liberalization with European countries. Moreover, the structure of the exports with two regions is very different. High value added machinery and manufacturing products are being sold in the CIS markets. The reason for that is common product standards and a long participation in the cooperation networks with post-Soviet economies. In contrast, the European direction of the Ukrainian exports is dominated with raw materials and agricultural products. In 2013 66% of total exports of Ukraine's machinery and equipment and 51% of chemical products were sold in the CIS, while the relevant figures for the EU were only 21% and 16% respectively (Derzhkomstat, 2015).

The new wave of liberalization of the Ukraine's external trade was marked by the accession of the country into WTO in 2008. However, the effect of this liberalization was blurred by the subsequent economic and financial crisis of 2008-2009 that brought the Ukrainian economy - dependent on exports of agricultural goods and raw materials and vulnerable to international price movements - into stagnation. At the same time Shepotylo and Vakhitov (2015) argue that liberalization of services market caused by country's entry to WTO greatly contributed to the rise of manufacturing sector productivity. They stressed the importance of role of services liberalization in economy's efficiency while direct liberalization of trade in goods had probably

a minor impact. The recent EU-Ukraine Association Agreement will offer new opportunities for Ukrainian companies to expand their manufacturing exports into European markets. The EU-Ukraine Association Agreement was signed on June 27th, 2014, but the implementation of its economic part is postponed until January 1, 2016. For agricultural goods, EU concessions have been made taking into account sensitivities of some agricultural goods. Thus, duty free tariff rate quotas have been granted to the Ukraine for cereals, pork, beef, poultry and a handful of additional products, while for others the progressive elimination by the EU of the custom duties will occur over a longer transition period (generally 10 years). This means that for particularly sensitive sectors, the scope of DCFTA liberalization is delayed and limited.

As regards non-tariff barriers (NTB) on trade in goods, the Agreement incorporates the fundamental WTO rules on NTBs, such as MFN and national treatment, prohibition of import and export restrictions, etc. Export duties will be prohibited from day one, with some temporary exceptions for some Ukrainian agricultural (sunflower oil) and metal products of minor importance (recycled metal).

In the meantime EU Autonomous Trade Preferences for Ukraine are in force (Regulation of EU Council and parliament № 1150/2014). According to this temporary regime 83.4% of tariff lines in agricultural products (CN 1-24 groups) are tariff free for Ukraine's trade in EU. 15.9% of Ukrainian agricultural products are eligible for zero tariff quota. This intermediate trade arrangement helped Ukraine to withstand the export slump in the Eastern markets. The volume of exports to the European Union in the first half of 2015 accounted for 67% of the same level in 2014 (Derzkomstat, 2015).

At the same time the exports of Ukraine's enterprises to the CIS countries decreased abruptly due to the change in political situation after the collapse of the Yanukovich government and signing of the agreement with EU. In the first half of 2015 exports of Ukraine to CIS amounted only to 44% of its level in the previous year. By the end of 2014 the share of exports to EU almost exceeded the share of CIS. At the same time Ukraine's GDP went down by 7% in 2014 and 9% in 2015. Once the political crisis is over, then CIS markets should be available for Ukrainian firms again. Thus the Ukrainian companies should be able to increase their exports to CIS markets like the other Central and Eastern Europe countries in the 2000s.

Ukraine's exports regional distribution which is uneven. In 2014 major exporting regions of Ukraine were Kyiv city (25% of the total exports), Dnipropetrovsk (19%), Donetsk (10%), Zaporizzya (8%), Odesa (4%), Poltava (4%), Kyiv region (4%) and Mykolajiv (4%). Most regions with the highest export revenues are located in the Eastern and Southern Ukraine. The joint share of the Western regions in export revenues, such as Lviv, Ivano-Frankovsk, Lutsk and Uzhgorod is less than 10% of the total exports. At the same time, these are Western regions which predominantly trade with EU. For example, the CIS share in Lviv region's exports was 25% in 2013 and the share of EU was 67%. The corresponding indicators for Eastern region Dnipropetrovsk were 36% and 18%. Kyiv city was more EU-oriented as EU represents 30% and CIS – 18% in the total exports of the city (Derzkomstat, 2015).

The liberalization of the economy did not bring substantial inflows of foreign direct investment into the country. In the mid of 2015 the accumulated FDI stock in the Ukraine's economy amounted to 42.831 bln USD, or only USD1000 per capita. The inflow of FDI in the financial sector follow the similar trend to other countries in the Central and Eastern Europe. The biggest transactions involving foreign capital were the purchases of Ukrsotsbank by Raiffaisen Bank and Ukrsibbank by BNP Paribas. The purchase of steel-maker Zaporozhstal by Arcelor Mittal, international steel giant was the biggest industrial deal. A relatively small involvement of foreign direct investors in Ukraine may be explained by a close relationship between local

business and the government that limited takeovers of local firms.[2] Our paper attempts to fill the gap in the existing literature as it empirically examines the link between the productivity and export activity of Ukrainian firms.

Methodology of the research

In this study we analyse empirically the firm-level determinants of export decisions. In particular, we focus on estimating the theoretical relationship between firm-level productivity and exporting postulated by the Melitz (2003) model for Ukrainian manufacturing and service firms. This approach is an equivalent of studying changes in the extensive margins. In other words, this means a positive effect on trade through an increase in the number of exporting firms or products exported. In addition, we take into account other firm and industry characteristics that may also affect export performance such as the firm age and the size of the firm, the role of foreign and private ownership, capital-labor ratios and the degree of competition within the industry.

To investigate empirically the relationship between firm productivity, measured by its TFP and exporting, having controlled for the set of additional firm and industry characteristics, we employ the probit regression. We develop the following empirical model to investigate the impact of individual firm characteristics on firm export performance. Let Yi* be our dependent variable indicating the export status of firm i. According to this model the export status of i-th firm can be related to the set of individual firm characteristics X in the following way:

$$Y_i^* = X_i\theta + \varepsilon_i \tag{1}$$

where the error term ε_i is independent of X_i which is a vector containing explanatory variables that affect exports with the first term equal to unity for all i, θ is the set of parameters that needs to be estimated.

However, since the data on the volume of exports for Ukrainian firms is not available, we only observe their export status that is described by the binary variable Y_i^*.

$$Y_i = \begin{cases} 1 & if\ Y_i^* > 0 \\ 0 & if\ Y_i^* = 0 \end{cases} \tag{2}$$

Hence, the probability whether a particular firm is engaged in export activity ($Y_i^* > 0$), expressed as a function of firm characteristics is given by:

$$\Pr(\mathrm{Y_i}=1|\mathrm{X_i}) = \Phi(\mathrm{X_i}\theta) \tag{3}$$

where $\Phi(\cdot)$ denotes the standard normal cumulative distribution function (cdf).

Data description

The data for our empirical study comes from several statistical sources. The main source of data is the State Committee of Statistics of Ukraine (http://www.ukrstat.gov.ua) for the period 2005-2013. The statistical information can be received for the purpose of scientific research. This data reflects the balance and income statement indicators related to fixed assets, total revenues, total labor cost, cost of materials, etc. Data on employment (total number of full-time workers) is received from employment authorities. Data on domestic and foreign ownership comes from the State Committee of Statistics of Ukraine. Data on export and import operations comes from External Economic Activity Database of the State Committee of Statistics of Ukraine. However, the export data is available only for two years: 2005 and 2013.

[2] Gorodnichenko and Grygorenko (2008) argue, however, that improvement in the productivity of firms controlled by oligarchs was higher in comparison to the average growth in 2001-2008.

The data is classified according to the KVED statistics which include both manufacturing and services. KVED is Ukraine's national classification developed by the agency State Committee for Technical Regulation and Consumer Policy to collect information on economic activity. There is KVED-2005 and KVED-2010 classification. Both of them are the equivalents of international industry classification standards. In the KVED 10 classification at 2-digit level KVED is comparable to (ISIC, Rev. 4 – 2008), at 4 digit level – to the EU classification (NACE, Rev. 2 - 2006). In the KVED-2010, active from January 1st, 2012 the number of services sectors has been increased (the higher level of disaggregation) in comparison to KVED-2005. Before that KVED-2005 classification was used.[3] In our analysis we converted all data to KVED-2005 classification in order to have the comparable set of data for 2005 and 2013.

The sectors in 2005 differ from the sectors in 2013 due to the change in the classification KVED which follows changes in international NACE classification. In 2005 Ukrainian enterprises reported according to the old classification system (3 agricultural sectors, 5 mining sectors, 23 manufacturing sectors and 28 services sectors).[4] In 2013 all the Ukrainian enterprises had to report according to the new system – KVED -2010 (3 agricultural sectors, 5 mining sectors, 25 manufacturing sectors, 56 services sectors). There are 310 482 enterprises in 2005 and 198 405 enterprises in 2013 in manufacturing and services together. The firms of various types of organizational forms are present – joint stock companies, limited liability companies, self-employed individuals. The enterprises are distributed among the economic sectors adequately to the structure of the economy of Ukraine. The regional location is also present and complies with the geographical distribution of the Ukrainian industry.[5] It should be noted that regressions are estimated for 2005 and 2013 years separately and jointly.[6]
The definitions of variables used in our empirical are reported in Table 1.

Table 1 Definitions of variables

VARIABLE	DEFINITION
export	Dummy variable indicating if an enterprise exports or not
lnTFP	Logarithm of total factor productivity calculated based on Levinsohn-Petrin input shares
lnSize	Logarithm of the total number of full-time employees
lnHHI	Logarithm of Herfindahl-Hirschman index for NACE 2-digit industry

[3] See: http://www.dkrp.gov.ua/info/842.

[4] For example, in 2005 4548 enterprises were big enterprises (employment more than 250 people), 14530 – medium enterprises (50-246 employees), 282966 enterprises – small enterprises (less than 50 employees). The number of firms for each year is reported in Table A1 in the Appendix.

[5] Only legal addresses of firms are available. For example, the biggest mobile operator Kyivstar has only one entry in the data set with the consolidated financial figures, located in Kyiv, the head-quarter's city. The data is available as reported to the statistics committee and government. There is no distinction between production and sales units.

[6] In our study of export performance we use data for individual enterprises from 2005 and 2013, but the dataset is not balanced. An enterprise can be present in all years from 2005 to 2013, but in most cases the enterprise is only active in several years inside 2005-2013 period. 36% of manufacturing firms operating in 2005 remained in 2013. 74% of manufacturing firms in 2013 were still active in 2005. 29% services enterprises in 2005 kept on operating in 2013. 43% of services enterprises in 2013 were active in 2005. 30% of firms (manufacturing and services pooled) operating in 2005 still operated in 2013. 46% of 2013 firms were still present in 2005.

VARIABLE	DEFINITION
Import	Dummy variable indicating if an enterprise imports or not
lnKLratio	Logarithm of the capital to labor ratio
private	Dummy variable indicating private ownership of an enterprise
foreign	Dummy variable indicating foreign ownership of an enterprise[1]

[1] The ownership by foreign capital is derived from the name of the enterprise. If there is a phrase "with foreign investment" in the name, the dummy variable is 1.

The dependent variable is a dummy variable called export which is equal to 1 if the firm is receiving proceeds in the foreign currency from abroad, and 0 in the opposite case.[7]

The level of firm productivity was measured by TFP calculated on the basis of the Levinsohn-Petrin (2003) methodology. The levpet function in STATA used the following variables to calculate the input shares at the 2-digit sector level: total revenues (UAH), fixed assets at the end of period (UAH), the number of employees (the number of people), the cost of materials (materials, fuels, electricity, UAH).[8]

Input shares for the TFP estimation were calculated on the basis on the panel data of enterprises for the period from 2005 to 2013 year. The estimation procedure to calculate input shares is the same for manufacturing and services. To estimate the input shares in 2006 we have 331431 enterprises, in 2007 - 355902 enterprises, in 2008 – 339790 enterprises, in 2009 – 352805 enterprises, in 2010 – 296521 firms, in 2011 – 243 422 firms, in 2012 – 133 383 enterprises. The enterprises belong to manufacturing and services sector (sectors 15-95 of KVED-2005 classification).

The degree of competition within the sector was measured by the Herfindahl-Hirschman Index (HHI). This is a commonly used measure of market concentration in the empirical industrial organization literature. It is calculated for each of the available KVED-2005 sectors so that $HHI = \sum_{i=1}^{N} \left(\frac{TR_i}{\sec TR} * 100\right)_i^2$, where N – the number of enterprises in sector i, TR- the total revenues of the enterprise i, secTR – the sum of total revenues of all enterprises in sector i. Sectors are ranging from 15 to 95 (manufactures and services) according to KVED-2005. The higher value of Herfindahl-Hirschman index is indicating greater level of industry concentration. The summary statistics for years 2005 and 2015 are reported in Tables 2a and 2b, respectively.

Table 2a Summary statistics for 2005

Variable	Obs	Mean	Std. Dev.	Min	Max
export	302044	0,0	0,2	0	1
Size	300690	23,5	492,7	0	121617
import	302044	0,0	0,2	0	1
KLratio	291394	1865,2	72779,6	0	1,66E+07
TFP	172696	1081,9	25393,0	0	3924225
HHI	302044	279,6	517,5	12,3	4653,5
foreign	302044	0,0	0,1	0	1
private	302044	1,0	0,2	0	1

[7] For example, in the case of the service sector financial institutions may have clients from abroad.

[8] The estimation of input shares was performed for all 2-digit sectors. Due to the limited number of observations some of the sectors were merged. The way in which sectors were merged is reported in the Appendix.

Table 2b Summary statistics for 2013

Variable	Obs	Mean	Std. Dev.	Min	Max
export	198405	0,0	0,1	0	1
Personal	119596	49,3	631,7	0	96477
import	198405	0,0	0,2	0	1
KLratio	118930	4876,6	75270,0	0	7842810
TFP	117477	1180,7	39177,4	0	9421698
HHI	198405	162,0	401,4	12,3	4653,5
foreign	189214	0,0	0,0	0	1
private	189214	1,0	0,2	0	1

The correlations between our explanatory variables for 2005 and 2013 are reported in Table 3a and Table 3b respectively.

Table 3a Correlations between explanatory variables, manufacturing and services, 2005

	export	Personal	import	KLratio	TFP	HHI	foreign	private
export	1							
Personal	0.0352	1						
import	0.3395	0.0368	1					
KLratio	0.0007	-0.0005	0.0018	1				
TFP	0.0205	-0.0012	0.0132	0.0084	1			
HHI	-0.0796	-0.0011	-0.092	0.0138	-0.0238	1		
foreign	0.0465	0.0025	0.0844	0.0067	0.0009	-0.0011	1	
private	0.0342	-0.0376	0.0453	-0.0083	0.0091	-0.033	0.0149	1

Table 3b Correlations between explanatory variables, manufacturing and services, 2013

	export	Personal	import	KLratio	TFP	HHI	foreign	private
export	1							
Personal	0.0565	1						
import	0.2712	0.0451	1					
KLratio	-0.0026	-0.0017	-0.0082	1				
TFP	0.0043	-0.0005	0.0074	0.0493	1			
HHI	-0.0161	0.0317	-0.0459	-0.0037	-0.0097	1		
foreign	0.0334	0.0064	0.0503	0.0101	-0.0002	0.0131	1	
private	0.0276	-0.0665	0.046	-0.0132	0.0047	-0.1154	0.0085	1

Estimation results

In this section we present two sets of our empirical results. First, we present the pooled estimation results for both years and then separate results for particular years: 2005 and 2013.

In Table 4 we show pooled estimation results for both years of the sample. We start with the results obtained for all sectors in the economy. Then, we present results obtained separately for service and manufacturing sectors.

Table 4 Estimation results for the pooled data set (2005 and 2013 jointly).

	Pooled	Services		Manufacturing		
	1	2	3	4	5	6
lnTFP	0.108	0.139	0.147	0.121	0.023	0.166
	(35.20)**	(31.76)**	(39.33)**	(24.68)**	(3.44)**	(14.99)**
lnSize	0.226	0.233	0.198	0.228	0.222	0.228
	(60.36)**	(55.65)**	(40.80)**	(43.73)**	(32.64)**	(30.84)**
lnKLratio	0.044	0.063	0.052	0.066	0.049	0.046
	(16.32)**	(20.68)**	(16.01)**	(18.90)**	(8.48)**	(7.40)**
import	1.089	0.965	0.886	0.79	1.42	1.362
	(79.19)**	(65.68)**	(52.45)**	(44.56)**	(53.78)**	(48.23)**
private	0.835	0.615	0.657	0.632	0.613	0.509
	(22.73)**	(14.72)**	(14.47)**	(12.37)**	(8.57)**	(6.69)**
foreign	0.193	0.243	0.188	0.206	0.344	0.357
	(3.63)**	(4.37)**	(2.84)**	(3.05)**	(3.52)**	(3.47)**
lnHHI	0.061	0.214	-0.034	0.001	0.119	-0.265
	(13.71)**	(13.26)**	(5.62)**	-0.04	(8.29)**	(2.74)**
year05	-0.416	-0.494	-0.431	-0.555	0.331	0.427
	(34.25)**	(37.61)**	(29.62)**	(35.62)**	(13.65)**	(15.77)**
Constant	-4.148	-5.312	-3.916	-4.885	-3.93	-2.896
	(83.15)**	(57.84)**	(62.62)**	(36.79)**	(32.35)**	(6.22)**
Sectoral and regional effects	No	Yes	No	Yes	No	Yes
N	215416	215365	178852	178801	36564	36564
Pseudo R2	0.2199	0.2957	0.2009	0.2497	0.2525	0.3094

(Absolute value of z-statistics in parentheses) * significant at 5%; ** significant at 1%

In column (1) of Table 4 we present baseline results for all industries (pooled service and manufacturing sectors) for 2005 and 2013 combined without controlling for industry and region

specific effects. It turns out that all explanatory variables are statistically significant already at the 1 per cent level of statistical significance and display the expected signs. In particular, the estimated coefficient on the TFP variable is positive which means that the probability of exporting increases with individual firm's TFP. This result is in line with the main prediction of the Melitz (2003) model. In addition, we find the probability of exporting is positively related to the firm's capital-labor ratio. This means that the probability of exporting increases with individual firm's capital intensity. Moreover, the estimated coefficient on the firm size variable also displays a positive sign. This means that the probability of exporting increases with the larger number of employees reflecting mostly firm-level economies of scale. This result is in line with many other empirical studies on firm-level determinants of export performance.

The export performance of Ukrainian firms depends also on their internationalization. In particular, the probability of exporting is positively related to firm's import status. This means that the probability of exporting is higher for the firms that are also importers. Moreover, firms with foreign capital ownership are more likely to export which is in line with the results of earlier empirical studies for other countries. In addition, also privately owned firms are more likely to export similar to other CEE countries. Finally, we find that the market structure also matters for export performance. In particular, the probability of exporting increases with the higher value of the HHI. This means that higher market concentration (i.e. domination of large firms in the market structure) in the industry increases the probability of exporting. The estimator coefficient on the dummy for the year 2005 demonstrated negative sign indicating that the propensity to export of Ukrainian firms has increased in 2013 in comparison to year 2005.

In the column (2) we report the pooled results controlling for industry and region specific effects. The results are the same as in column (1) in terms of statistical significance of coefficients of estimators and the values of estimators are quite similar to the ones reported in column (1). The majority of estimated coefficients on dummy variables of sectors and regions were statistically significant.[9]

In the column (3) we report the pooled results for the services sector. The value of coefficients and their statistical significance is similar to the results reported in columns (1) and (2) with the only exception of the market concentration variable.

In column (4) we report estimates for the services sector having controlled for industry and region specific effects. These results are similar to the results reported in column (2). This is not surprising given the fact that service firms constitute the majority of enterprises in the pooled sample.

In the column (5) we report the results for the manufacturing sector only. The results are very similar to the ones in columns (1) and (3)[10].

In column (6) we report the results for manufacturing firms controlling for industry and region specific effects. It turns out that estimated parameter on TFP variable displays an expected positive sign and is statistically significant at the 1% level. It confirms the main prediction of the Melitz model regarding the positive relationship between firm productivity and export performance of firms within particular industries in the manufacturing sector.

In Table 5 we report the values of estimated individual effects for specific regions obtained from specifications reported in columns (2), (4) and (6) of Table 4, respectively.

[9] The estimation results for individual region-specific effects are reported in separate Table 4.

[10] We also investigated the relationship between exporting and relative TFP. The relative TFP was defined as individual TFP related to the mean TFP in the industry. In this case the relationship between exporting and relative TFP was positive and statistically significant. These additional results can be obtained from the authors on request.

Table 5 Region specific effects for the pooled dataset (2005 year and 2013 year)
(Absolute value of z statistics in parentheses)

Regions	Pooled	Services	Manufacturing
Kyiv	0.022	0.133	-0.127
	(0.60)	(2.80)**	(1.97)*
Zhytomyr	0.365	0.541	0.059
	(7.01)**	(8.20)**	(0.68)
Chernihiv	0.228	0.342	0.040
	(3.95)**	(4.54)**	(0.43)
Cherkasy	0.242	0.356	0.046
	(4.53)**	(5.20)**	(0.52)
Vinnytsia	0.246	0.403	-0.024
	(4.72)**	(6.13)**	(0.28)
Kirovograd	0.136	0.147	0.093
	(2.13)*	(1.72)	(0.91)
Khmelnytskyi	0.175	0.193	0.107
	(3.15)**	(2.60)**	(1.22)
Rovno	0.240	0.390	-0.044
	(4.23)**	(5.54)**	(0.45)
Poltava	0.127	0.313	-0.290
	(2.48)*	(5.02)**	(3.06)**
Summy	0.251	0.392	0.004
	(4.53)**	(5.66)**	(0.04)
Lutsk	0.401	0.497	0.226
	(7.49)**	(7.45)**	(2.41)*
Ternopil	0.120	0.230	-0.058
	(1.87)	(2.72)**	(0.57)
Dnipropetrovsk	0.069	0.192	-0.163
	(1.66)	(3.69)**	(2.25)*
Mykolajiv	0.192	0.294	-0.016
	(3.54)**	(4.41)**	(0.16)
Chernivtsi	0.428	0.453	0.362
	(6.91)**	(5.45)**	(3.72)**
Kharkiv	0.185	0.308	-0.028
	(4.47)**	(5.86)**	(0.40)
Odesa	0.208	0.290	0.114
	(4.72)**	(5.26)**	(1.47)
Zaporizhzhe	0.166	0.280	-0.049
	(3.60)**	(4.85)**	(0.61)
Kherson	0.238	0.388	-0.113
	(4.11)**	(5.58)**	(1.01)
Ivanofrankivsk	0.402	0.472	0.267
	(7.73)**	(6.95)**	(3.17)**
Lviv	0.199	0.270	0.077
	(4.64)**	(4.91)**	(1.09)
Donetsk	-0.045	0.050	-0.233
	(1.04)	(0.91)	(3.18)**
Uzhgorod	0.607	0.649	0.525
	(11.88)**	(9.77)**	(6.25)**
Luhansk	0.119	0.211	-0.044
	(2.43)*	(3.39)**	(0.55)
N	196419	161349	35070
Pseudo R2	0.2889	0.2465	0.2983

* significant at 5%; ** significant at 1%

The highest values of estimators for the region specific effects for pooled data reported, in column (1), are obtained for Uzhgorod, Chernivtsi, Ivano-Frankivsk and Lutsk which all are located in Western Ukraine. This means that the probability of exporting for companies located in the Western part of Ukraine is higher compared to the firms located in other regions of the country.[11] Interestingly, a higher number of statistically significant estimated parameters on region specific effects is reported for the companies in the services sector than for the manufacturing firms. Surprisingly, the traditional manufacturing regions, that account for majority of exports and are located in the Eastern part of the country, such as Dnipropetrovsk and Donetsk, do not display positive and statistically significant effects for manufacturing firms. Also the capital city of Kyiv, which is the largest agglomeration in Ukraine, is not export-oriented in terms of manufacturing, but rather in terms of services. This probably means that Kyiv is an important services hub.
The Table 6 reports the results obtained for year 2005 and 2013 separately.

Table 6 Estimation results separately for 2005 and 2013
(Absolute value of z statistics in parentheses)

	2005			2013		
	Pooled	**Services**	**Manufacturing**	**Pooled**	**Services**	**Manufacturing**
	1	**2**	**3**	**4**	**5**	**6**
lnTFP	0.131	0.117	0.167	0.135	0.144	0.099
	(22.85)**	(18.64)**	(12.01)**	(16.09)**	(15.81)**	(4.54)**
lnSize	0.204	0.191	0.216	0.283	0.283	0.287
	(37.77)**	(27.04)**	(24.60)**	(38.87)**	(33.74)**	(18.73)**
lnKLratio	0.066	0.067	0.057	0.059	0.062	0.034
	(16.03)**	(13.60)**	(7.62)**	(12.26)**	(11.78)**	(2.71)**
import	0.949	0.771	1.33	0.882	0.752	1.36
	(49.97)**	(33.21)**	(38.29)**	(34.80)**	(25.83)**	(24.56)**
private	0.501	0.519	0.447	0.817	0.864	0.714
	(10.02)**	(8.43)**	(5.08)**	(9.68)**	(8.44)**	(4.55)**
foreign	0.228	0.177	0.367	0.22	0.219	0.249
	(3.45)**	(2.20)*	(3.04)**	(1.97)*	-1.63	-1.17
lnHHI	0.073	0.082	0.271	-0.443	-1.351	0.088
	(1.66)	(1.9)	(5.24)**	(2.90)**	(1.66)	(1.09)
_cons	-4.987	-5.022	-4.668	-2.312	3.591	-4.396
	(15.31)**	(15.51)**	(14.69)**	(2.80)**	(0.64)	(8.19)**
N	113157	87953	25204	83162	73296	9866
Pseudo R2	0.2938	0.2611	0.2961	0.2753	0.2213	0.3136

* significant at 5%; ** significant at 1%

[11] These results are related to the findings of Kim et al. (2015) who documented highest increases in productivity in Western regions.

The comparison of the results obtained for specific years with pooled results presented in Table 6 reveals no major differences both in terms of statistical significance and the value of estimators. In particular, the estimated parameter on TFP variable is similar to the one in the pooled specification results. This means that the positive relationship between productivity and exporting is present in 2005 and 2013 subsamples (column (1) and column (4)). It can also be noted that this relationship is present in both services and manufacturing sectors (columns (2)-(3) and columns (5)-(6)).

There are also quite clear similarities between variables such as size, the capital labor ratio, import status and private ownership. The major differences exist in the estimated parameters on foreign ownership and the Herfindahl-Hirschman index. Foreign ownership became statistically insignificant in 2013. The Herfindahl-Hirschman index is not significant in 2005 for services and 2013 for services. It seems that the positive impact of concentration in the manufacturing sector that was present in 2005 disappeared in 2013.

Conclusions

In this paper we investigated the determinants of export performance of Ukrainian firms. The study is based on the firm level data including both manufacturing and services sectors. The study covered two years - 2005 and 2013. We estimated probit regressions for the pooled dataset that included both years and both sectors. Next, we distinguished between manufacturing and service sectors. We also analyzed the region specific effects.

Our estimation results indicate that the probability of exporting is positively related to the level of total factor productivity in all estimated specifications, having controlled for the other firm and industry specific characteristics. These results are in line with main predictions of the Melitz model which stressed the link between firm-level productivity and export. The other significant variables affecting the probability of exporting include the firm size, capital labor ratio, ownership status, and foreign sourcing (imports). In particular, we found the positive relationship between the firm size and exporting, as well as between capital labor ratio and exporting, suggesting some evidence of existence of economies of scale at the firm level. In addition, we found that internationalization of firms measured by the presence of foreign capital and imports increased the probability of firm's exporting. This means that further trade liberalization in Ukraine, in particular with the EU countries, should positively contribute to the improvement in firm imports and export performance.

Moreover, in the majority of estimated specifications we found that private companies outperformed state-owned firms in terms of exporting. The estimated parameter of market concentration in the manufacturing sector was positive and statistically significant only in some specifications. These results suggest that the determinants of exports performance of Ukrainian firms are similar to the determinants of the firms from European Union. Moreover, we found that determinants of export performance are very similar for manufacturing and service firms. Finally, we found that firms located in Western regions of the country, despite their smaller role in overall exports, were more likely to export in comparison to firms located in other regions.

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Appendix

Table A1 The numbers of firms in each year in the period 2005-2013.

Year	Freq.	Percent.	Cum.
2005	310,482	12.12	12.12
2006	331,431	12.94	25.05
2007	355,902	13.89	38.94
2008	339,790	13.26	52.21

Year	Freq.	Percent.	Cum.
2009	352,805	13.77	65.98
2010	296,521	11.57	77.55
2011	243,422	9.50	87.05
2012	133,383	5.21	92.26
2013	198,405	7.74	100.00
Total	2,562,141	100	

Table A2. TFP for industry, including merged ones, UAH

Activity code	Sector	mean	Number
15&16	Food, beverage and tobacco	263.4	33406
17&18 &19	Textile, garments, leather and leather footware	10.4	25444
20&21	Wood and paper	25.9	17177
22	Publishing, printing industry, reproduction of printed materials	356.2	23965
23	Manufacture of coke, refined petroleum products and nuclear fuel	779.4	807
24	Chemical Industry	81.8	7402
25	Rubber and plastic industries	77.7	8603
26	Manufacture of other non-metallic mineral products	55.6	13187
27	Metallurgy	717.0	2456
28	Recycling of metal	85.7	13365
29	Manufacture of machinery and equipment	54.8	20855
30	Production and office computers	87.3	1695
31	Manufacture of electrical machinery and apparatus	77.2	8459
32	Production of equipment for radio, television and communication	78.4	2868
33	Manufacture of medical apparatus and instruments; exact measuring devices, optical devices and watches	41.7	6260
34	Vehicle production	38.8	2110
35	Manufacture of other transport equipment	60.7	3138
36	Manufacture of furniture; other production	47.8	9342
37	Treatment of wastes	660.5	3096

40	Electricity, gas and water	1138.6	5733
41	Collection, purification and distribution of water	103.3	6849
45	Construction	79.9	107360
50	Trade in vehicles and their repair	258.5	24020
51&52	Wholesale and retail trade	712.5	562806
55	Hotels	24.7	37021
60	Ground transportation	93.9	25710
61	Water transport	572.3	611
62	Air transport	54.5	565
63	Supporting and auxiliary transport services	189.7	20172
64	Post and communication	359.5	7099
65	Financial intermediation	265.4	4233
66	Insurance	380.4	2481
67	Support Banking, finance and insurance	6223.5	4601
70	Real estate	549.8	70438
71	Hiring without attendants	53.7	6172
72	Activities in the field of information	0.0	34414
73	Research and development	206.0	15957
74	Services are mainly legal persons	0.0	172949
75	Public administration	114.4	777
80	Education	0.0	13651
85	Health care and social assistance	40.9	15345
90	Sewage disposal, street cleaning and refuse disposal	66.0	6086
91	Social activities	305.2	266
92	Activities in recreational, cultural and sporting	254.1	14548
93		47.6	14135
95		0.0	46

POWER SHIFTS AND NEW BLOCS IN THE GLOBAL TRADING SYSTEM

EDITED BY
SANJAYA BARU AND SUVI DOGRA

IISS

JTSR (2017) 24: 83-93
DOI 10.14665/1614-4007-24-2-007

PAPER

A General View about Games Abstention, Absence, Alternatives

Nando Prati

Abstract In this paper we introduce a new and more general kind of cooperative games in which players have many alternatives to choose, or many goals to try to realize, but also have the possibility of abstaining or of being absent for a while. In these games we define coalitions and study their properties observing how it is possible to obtain all the classical definitions of cooperative game theory inside this new setting.

Keywords Cooperative Games, Characteristic Function, Alternatives, Abstention, Absence.

JEL Classification C71, D71

Introduction

In classical cooperative game theory it is assumed that every player tries to win, that is: it is assumed that every player makes all possible efforts in order to obtain the result he/she wants, and it is also assumed that every other behaviour (i.e. abstention, absence or partial efforts) can not give the same advantages to the player. By this some author says simply that abstention is not a good choice for a player; the same happens for absence. The same way of reasoning says, in practice, that there are only two alternatives in the final result of the game: the best possible result (win) and all the other possible results resumed in one single event (loss); moreover, every consideration is so concentrated in the first result (win) that the second possibility is never explicitly expressed. By this assumption, every definition and property of cooperative games follows. In particular, it follows that a coalition is simply a subset of the set of players.

If we look at what happens in reality, for instance in a parliament in the moment of a ballot, we see that players in the same coalition (in this case parties) may behave in different ways: a party in a coalition can vote in favour of the law at ballot, but also can abstain (i.e. it is present but does not vote), or it can be absent from the game (for instance leaving the parliament for a while). And we must say that this last possibility has been used quite often in the Italian parliament. So they have many ways of expressing some partial and/or temporary disagreement with the rest of the coalition. Absence and abstention are really used by players in the game to obtain some kinds of advantages, that may be: long term advantages, side payments, and so on. Absence and abstention can be considered in the classical case only taking into account all the (classical) games that can be obtained starting from a fixed game,

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assuming that a voter abstains or is absent. Analogously for direct or indirect shareholders of a corporation, where, in a shareholders' meeting a shareholder may be absent, or present, and, in this case, it can abstain or vote in some way.

On the other side, it is possible that the result of the game may be not only the victory of a group of players and the loss of another group: for instance we may have a tie. And in other cases there may be many alternatives a player can choose, as we will discuss later.

The possibility of abstention has been considered first some times ago, by Fishburn (Fishburn 1973), but in a different context, see also (Felsenthal and Machover 1997) where Fishburn's considerations have been remade. After, it was always excluded, and it has been considered again only recently as a distinct alternative, see hereafter. Roughly speaking: all the authors considered abstention as an 'unreasonable' alternative for a player and so discarded, because they assumed that power, or any other kinds of advantages, can be achieved only with active playing. 'But authors do not even bother to supply this rationalisation. More surprising still: when dealing with real-life decision rules […] most authors mis-report the rules as though abstention were not a distinct option' (Felsenthal and Machover 1998, p.22). This mis-representation is due to the assumption just mentioned that leads to 'what philosophers of sciences have called theory-laden or theory-biased observation - a common occurrence, akin to optical illusion, whereby an observer's perception is unconsciously distorted so as to fit a preconception' (Felsenthal and Machover 1998, p. 280).

Indeed, sometimes it is possible to identify abstention with, for instance, a 'no vote', e.g. in a parliament where a motion is approved only if the majority votes yes, but, in a more correct way, abstention must be represented as a distinct alternative.

For other discussions about abstention see comment 2.2.4 together with the discussion at the beginning of chapter 8 in (Felsenthal and Machover 1998), and (Felsenthal and Machover 2001).

But the possibility of absence is absent from the most part of papers too! If we look at the papers on the subject we see also that absence is nearly never considered. Unique exceptions: 1) Felsenthal and Machover 2001: in a note at p.88, they say that they consider abstention in a 'wide sense', i.e. also as the possibility of absence. 2) Freixas and Zwicker 2003, p.401, note 1: 'But a voter may abstain for a host of other reasons -such as absence […]-.' So identifying absence with abstention in most cases. Noting just after that: 'An exception […] arises when a voting system includes a provision for a quorum. [...] in such a case it may prove impossible to identify an absence with an abstention [...]'. Indeed absence changes the game, and so it seems not possible to consider it as an alternative of the same kind of the other ones.

On the other side, it has been observed that a player may have many alternatives to choose, for instance when players have to choose among many candidates for some place/ job. Indeed there are several papers considering games in which players have this possibility, see for instance the papers of: Bolger, Amer et al., Freixas et al., Felsenthal and Machover in the bibliography. In these papers abstention at the vote, that is in the input of the game, can be considered as one of these alternatives, as well as a tie in the output. The aim of these papers is to define and characterize some sort of power index, using the order structure on the alternatives when this is present, in particular in Freixas et al., and in Felsenthal and Machover papers.

Roughly speaking, in these papers we have a set of indices contained in the set of integers together with the natural order on the indices: these indices indicate the various choices (or alternatives) a player has, and/ or the "quantity of effort" the player puts in his choice. One of the choice stands for abstention, usually 0. Due to the structure of the choices it is not possible to consider the possibility of absence, since absence is not (simply) another alternative or another behaviour; absence is a completely different alternative and a completely different behaviour.

Absence of a player changes the game into another different game since the absent player has gone away. So, this possibility must be taken into consideration in another way.

In this paper we take abstention seriously and we consider it as a reasonable behaviour of a voter. Moreover, we consider reasonable the possibility of absence too. So, we introduce games in which players have many alternatives to choose but also the possibility of abstention and/or absence. Then, generalizing what has been done so far, we introduce coalitions in this new setting in a way that is very similar to the way in which coalitions are considered in a parliament, i.e. in a very general sense.

In future papers we will introduce a power measure in a Banzhaf - Colemann style showing some of its properties, and we will show examples of particular applications of the games introduced here. Moreover, we will extend what is introduced here to the case of indirect control of corporations, see Gambarelli and Owen (1994) and Denti and Prati (2001) and (2004).

In section 1 we show an introductory example together with some discussions. In 2 we give the definitions of cooperative games in which players have many alternatives to choose, but also have the possibility of abstaining or of being absent for a while. In 3 we re-build classical games in the new setting.

1. Initial Examples and Observations

Throughout the paper we try to stick to the terminology of Felsenthal and Machover (1998). We begin considering some examples of classical weighted voting games, hereafter wvg, where bills are passed with simple majority.

1.1) Example Part I (and Definition)

A board has three voters A, B, C, with weights respectively: 3, 2, 1. A bill is passed with simple majority. Here the voters have only two alternatives: a player can join a certain coalition/group to try to win, or join the other coalition/group, i.e. the complementary one, again to try to win, and prevent, in the same time, the victory of the first group.

a) If all the voters are present and 'active', the majority quota is $q=4$, and the game is: G=[4; 3,2,1]. We denote this game as the *principal game*.
b) Suppose voter C decides to abstain: then we obtain the following wvg derived by the principal game G: G_1=[4; 3,2,0].
c) Now suppose C leaves the board (i.e. the game): then we obtain another wvg derived by the principal game: G_2=[3; 3,2,Ø] where we indicate with Ø the fact that player C is absent. Naturally this game coincides with the game [3;3,2], and in this last game we have that A is a dictator on the contrary of the previous case.

So, starting from the principal game we can obtain several derived games considering all the possibilities the three players have: be active, abstain, be absent. In particular, for the game with only three voters in this example we have then 26 different derived games (with the empty game): together with G_1 and G_2 seen above we have G_3=[4; 3,0,1], G_4=[2; 3,Ø,1], G_5 =[4; 0,2,1], G_6=[2; Ø,2,1], G_7=[4; 3,0,0], G_8=[2; 3,0,Ø], and so on.

So we have seen in a practical case what has been observed by Freixas and Zwicker (2003) in the quotation above: abstention and absence change the game. Moreover, it seems not possible to consider absence as an 'alternative' in the same way as abstention; using now the word coalition in an intuitive sense, a coalition of voters has different possibilities of winning in the three cases, i.e.: a) when all the voters are present in the game and active; b) when some of them abstains; c) when someone is missing.

If we look at the example above we see that the coalition {A,B} wins in several different cases:

- when the two members of the coalition are active: see (for instance) G;
- when some voter is abstaining: see G_1;
- when some voter is absent: see G_4.

For other considerations and examples of games derived by a principal game, see Prati (2002). About wvg's we observe the following, leaving proof and counterexamples to the reader:

2) Observation

Let *N= {1, 2, ... , n}* be the set of players/voters (so *N* is also the *grand coalition*), then take the simple majority wvg *G= [q; w1, ... , wn]*. If the coalition *C* is winning in *G*, and $1 \notin C$, then C is winning in the two simple majority wvg's obtained by *G* when voter 1 abstains or is missing, while, if $1 \notin C$ and *C* is winning in the two derived games, then $C \cup \{1\}$ is still winning in these two games. If *C* is winning in the game obtained by *G* when 1 abstains, and $1 \notin C$, then *C* is winning also in *G*. The same happens for all the other players.

Voters in a board may have many alternatives to choose, and voters in a coalition may be more or less active, i.e. may decide to abstain or leave the game for a while.

In our opinion, it seems better to distinguish alternatives in the input of the game from alternatives in the output, as done in Freixas et al. papers, whose works generalize some of the preceding ones. See also the part 'Background and summary' in Freixas and Zwicker (2003) for some other hints in the comparison among papers on games with alternatives.

2. Generalizing Classical Cooperative Games

3) Definition and observations

Fix:

1) *N = {1, 2, ..., n}*, the set of voters / members/ players;
2) *AL = {A1, A2, ... , Am}*, with *m>2*, the set of alternatives or goals;
3) two symbols A and Ø, that do not belong to AL.

Then define:

a) AL' = ALÈ{A, Ø};
b) a situation, w.r.t. the set AL, is an n-tuple (s1, ... , sn) such that: for every i, siÎAL'.
c) If $(s_1, \dots, s_n)$ is a situation, then:
   c.1) $s_i=A_k$ should be interpreted as 'voter i is active and chooses alternative Ak';
   c.2) s_i= A as 'i is present but abstains';
   c.3) s_i= Ø as 'i is absent'.
d) If $s_i \neq A, Ø$ we say that voter *i* is active in the situation.
e) If $s_i \neq Ø$ we say that voter *i* is present.
f) If *S* is a situation then Ac(*S*)={ $i \in N$: *i* is active in *S*}, Pr(*S*)={ $i \in N$: *i* is present in *S*}.
g) Sit is the set of all the situations w.r.t. AL'.

4) Example (Part II)

In the wvg of example 1, with three voters A, B, C, and weights, 3, 2, 1, suppose there are two alternatives that are respectively A1 and A2, that can be interpreted, depending on the context, as: vote in favour of a law or contrary to it, or vote for candidate 1 or for candidate 2, or … .
The situations where all the voters are active are, for instance: $S_1=(A_1, A_1, A_1)$, $S_2=(A_1, A_1, A_2)$, $S_3=(A_1, A_2, A_1)$, and so on. The situations where some player is not active are, for instance:

$T_1=(A_1, A_1, Ø)$, $T_2=(A_1, A_1, 0)$, $T_3=(A_1, 0, Ø)$, and so on.
Now: note that situations determine not only the classical game that is going to be played, but also the set of (classical) coalitions playing in the game too, since, for instance:

- by S_1 is derived the game [4;3,2,1] in which the coalition {A,B,C} is formed and tries to obtain alternative A1;
- by S_2 is derived the game [4;3,2,1] in which the two coalitions {A,B} and {C} are formed; here the coalition {A,B} tries to obtain alternative A_1, and the complementary coalition {C} tries to obtain alternative A_2.
- And so on, while:
- by T_1 is derived the game [3;3,2] in which the coalition {A,B} is formed and tries to obtain alternative A_1 (while C is absent).
- by T_2 is derived the game [4;3,2,0] in which the two coalitions {A,B} and {C} are formed; here the coalition {A,B} tries to obtain alternative A_1, while {C} abstains.
- by T_3 is derived the game [3;3,0] in which the two coalitions {A} and {B} are formed; here the coalition {A} tries to obtain alternative A_1, while {B} abstains.

And so on, if we look only to classical games; on the contrary, if we think in a more general way, and paying attention to what happens in real situations in a parliament, by T_1 we may think that the game is always the game [4;3,2,1] and (for instance) the coalition {A,B,C} is formed but the voter C has gone away from the game for a while.
In the same way, if we consider situation T_4=(A1,A2, Ø) we may think that the game is always [4;3,2,1], and the coalition {A,C} is formed together with the coalition {B}, but here the voter C has leaved the game for a while, may be to obtain some particular favour from A. If we think only in a classical way, in this situation we should think that we are considering the game [4;3,2], and that the two coalitions {A} and {B} are formed.

As we have seen in the example, a situation is then a "photograph" of what every voter is going to do in that particular moment of a "large and long" game. Following these ideas we give:

5) Definition

a) Fixed a situation S=(s_1, ... , s_n), a coalition *C* in *S* is a subset of *N* such that: there is at most one alternative Ak such that:

1) for every $1 \in C$ then $s_i \in \{A_k, A, Ø\}$; and 2) for every $j \notin C$ then $s_j \in Al'-\{A_k\}$.

That is: *C* is a coalition if every voter in *C* either chooses the same alternative A_k or abstains or is absent, while voters outside C choose some different alternative, but may abstain or be absent too.

b) Co(S)={C: C is a coalition in the situation S}; if $T \subseteq Sit$, Co(T)={*C: C* is a coalition in S and $S \in T$}.
c) By the notation C_h we denote a coalition such that: for every $i \in C_h$, then $s_i \in \{Ah, A, Ø\}$. And we say briefly that the coalition is h-active, i.e. tries to obtain alternative A_h.
d) Fixed *S*, a partition of N in coalitions, w.r.t S, is an *(m+1)*-tuple P=(C_1,..,C_m,C_{m+1}) such that for every h=1,..,m, C_h is h-active in S, and $C_{m+1} = N - Y_{j=1}^{m} C_j$. So, C_{m+1} is the coalition of voters that do not want to take sides, and, if $i \in C_{m+1}$, then s_i=A,Ø.
e) If $T \subseteq S_{it}$, Pc(T)={P: P is a partition of N in coalitions w.r.t. S and $S \in T$}.
f) If $P \in Pc(T)$, and P=(C_1, ... ,C_{m+1}) and $C \in Co(S)$ with $S \in T$, then $C \in P$ stands for: there is h=1, .. ,m+1, such that $C_h = C$.

Therefore, a "*partition in coalitions*" is the formalization of the division of a board in different coalitions/ groups in a particular situation (instant), may be in the moment of a ballot or during some discussions. In Freixas et al. papers and in Felsenthal and Machover papers there is

a total order on alternatives which makes possible to interpret the medium alternative (i.e. 0) as abstention. In all the other papers on games with many alternatives, there is no structure on the alternatives. In all these papers, abstention can be taken into consideration but only as a particular alternative and voters can form a coalition only if they choose the same alternative. That is: if voter $i \in C$ chooses alternative k, then all the other $j \in C$ cannot choose another alternative; they cannot abstain neither, since abstention is just another alternative. But there can exists the coalition of the abstaining voters.

In our setting coalitions can be classified as more or less active in their behaviour:

6) Definition

a) A coalition C in S strongly chooses A_k, if for every $i \in C$, then $s_i = A_k$.
b) a coalition C in S partially chooses A_k, if for every $i \in C$, then $s_i \in \{A_k, A\}$.
c) a coalition C in S improperly chooses A_k, if for every $i \in C$, then $s_i \in \{A_k, A, \emptyset\}$.

The more interesting (and probably "stronger") coalitions are the strongly k-active coalitions, i.e. when all the voters in the coalitions choose the same alternative A_k and they are not absent neither abstain.

In the following by S, or S', we will always denote a situation; by C or D, or C_k, D_k, a coalition, and by P, or P', a partition in coalitions w.r.t. a given situation S.

7) Example

In a town council there are five parties Right, Middle Right, Middle, Left, Extreme Left, briefly R, MR, M, L, EL; they elected respectively 2, 3, 5, 1, 1 members in the council. Three candidates to mayor are presented: r, m and l respectively by party R, M and L. The candidate who gets more votes from the councillors will be elected, and a member or a party can abstain or be absent. The two parties MR and M formed a coalition to govern the town and they always voted together, but now members of MR don't want to vote m because his program is partially in conflict with MR's program. Because of this, M proposed some favours to MR members if m will be elected. So MR members leave the council at the ballot. In the same time EL that presented no candidate abstains. At the end of the story, m is elected. Here N={R, MR, M, L, EL}, and AL={r, m, l}. In the moment of the ballot the situation is S=(r,Ø,m,l,A). In this situation possible coalitions at the ballot are, for instance:

- {R} which is r-active;
- {M,EL} which is partially m-active;
- {MR,M} which is improperly m-active;
- {MR,M,EL}, {EL}, {R,EL}, and so on.

The set {M,L} is not a coalition here. The situation (m,Ø,Ø,Ø,m) seems impossible to be realized in the council: the two parties at the extreme wings vote together the candidate of the middle party, so forming a coalition (in practice and also in our setting), while all the others are absent. The set {{R},{MR,M},{L},{EL}} is a partition in coalitions of the voters in the situation S=(r,Ø,m,l,A) described early. Another partition in the same situation is {{R}, {MR,M}, {L,EL}}, and so on.

8) Definition (and comments)

A Game with Alternatives, Abstention, Absence G, briefly Gaaa, is characterized by:
a) a set of voters N={1, ... , n};

b) a set of alternatives AL with cardinality m≥2, and the two symbols A, Ø;
c) a set Sit(G) of possible situations, contained in Sit;
d) a set Out(G) of possible outcomes, such that: 1) Ø∈Out(G); 2) AL⊆Out(G). An alternative in the input of the game should be interpreted also as a goal or a result that can be interesting for some voter. But there can be some result that has no interest for all the voters or that cannot be foreseen, and this result is in Out(G) – AL.
e) a function Final Result, FR, with domain Sit(G)×Pc(Sit(G)) (the cartesian product of Sit(G) and Pc(Sit(G))), and range Out(G). If:
e.1) FR(S,P)= Ø, this means that no result has been achieved: that is we have a tie;
e.2) FR(S,P)=A_k, this should be interpreted as: 'the alternative A_k is chosen as a consequence of situation S and the distribution of coalitions in P', or 'goal Ak is reached';
e.3) FR(S,P)∈Out(G)-AL, this means that the outcome FR(S,P) has been achieved, but this outcome was not expected by the voters.
f) a function V(S,C,P), characteristic function of the Gaaa, with domain Sit(G)×ℙ(N)×Pc(Sit(G)), where ℙ(N) is the power set of N, and range ℝ+ (the set of reals x≥0) such that:
1) V(S,C,P)≥0; 2) if C= Ø or if C∉Co(Sit(G)) then V(S,C,P)=0.

Obviously V(S,C,P) should be interpreted as the (numerical) value, or 'the amount of utility' that the members of C can obtain from the game (Owen 1995, p.213) in the particular situation S, given the distribution of coalitions in P. By definition, the utility a coalition can obtain depends on the coalition itself, but also on the situation in which the coalition has been formed, that is, the utility of a coalition depends on the behaviour of the coalition itself together with the behaviour of all the other coalitions that are playing in the same situation.

Let us stress that a coalition may obtain some utility even it abstains or is absent: for instance, some side payment. It may obtain some advantages also if it chooses, in a more or less active way, some alternative that is different from the final result. For instance consider a parliament in which a bill has been just approved. A party may have voted against the bill, and so it has not reached its goal and we can say it has lost from the point of view of the ballot; but it may have gained a very great appreciation from the public, so its amount of utility is very high. This party can be considered the true winner from another point of view. This example shows also that a coalition may obtain the result for which it made its effort, so winning the game, but, in the same time earning less than another coalition, that is obtaining an amount of utility smaller than some other coalition.

By these considerations, in this paper we decided to distinguish the two functions FR and V that have been identified up to now in all the papers on power indices, where simply the function FR is implied. For instance in simple games the function FR coincides with the characteristic function that says who wins. In non-simple games it is (implicitly) assumed that a coalition wins if (and only if) it gains more than the other coalitions, and so the function FR again coincides with the characteristic function. In the classical case the function FR is not very important since it is assumed that everyone tries to win and players have only two alternatives: to join one group or to join the complementary group. These two groups/coalitions can win some amount of money (utility) that can be small or big depending on the situation or on the coalition itself. In classical games players have only two alternatives, i.e. win and loss, that are also the only two possible outcomes and they are never expressed explicitly. In practice the same happens in the other papers where several alternatives are considered.

In the definition above we admit games that are partially defined, i.e. when Sit(G) (that is the set of possible situation of the game) is a proper subset of Sit (the set of all the situations) since

there may exist situations that are impossible in the game even if they are possible in theory. On the contrary, up to now games have been defined in every situation, i.e. considering Sit(G)=Sit. The fact that Sit(G)$\subseteq$Sit, may be useful to discard from the context improbable situations (see example 7), or study games obtained from some practical case, when, for instance, some coalition has never been observed. It will be necessary also in the following in defining the classical case. By the characteristic function, i.e. the win, another interesting function can be obtained.

9) Definition

a) Let |X| be the cardinality of the set X.
b) s(C)=|{S: C$\in$Co(S) }$\cap$ Sit(G)|.
c) The medium win of a coalition C is the function Mwc with domain Co(Sit(G)) such that:

$$Mwc(C)=\frac{1}{s(C)}\sum_{P\in Pc(Sit(G))}\sum_{C\in Co(S)}V(S,C,P)$$

The value Mwc(C) is the media of all the possible wins a coalition obtains in all the possible situations. In order to study properties of V, we note that:

10) Example and observations

a) If C_k and D_h are coalitions in S but they choose the two different alternatives A_k, and A_h, then $C_k \cup D_h$ is not a coalition in S, and so V(S,C_k,P), V(S, D_h,P) are surely greater than V(S,$C_k \cup D_h$,P), since V(S,$C_k \cup D_h$,P)=0.
b) Consider the 'classical' simple majority wvg with only two alternatives A_1, and A_2, and with voters A, B, C, and D, whose weights are respectively (2,2,3,4). If D is absent, and the situation is S=(A_1, A_1, A_2, Ø), then the set {A,B} is a coalition and is winning in S. But if D is present in the game and abstains, the situation is S'=(A_1, A_1, A_2, A) and the set {A,B,D} is a coalition in S' but is not winning in S'.

This example shows that we cannot have strong forms of monotonicity. Generalizing the classical setting we define:

11) Definition

V(S,C,P) is monotone on coalitions in the situation S if: given two coalitions C and D in S, if C $\cup$D is a coalition in S, then for every P:
V(S,C$\cup$D,P)$\geq$ V(S,C,P), V(S,D,P).
If V is monotone on coalitions in S, we obtain that: if coalitions C and D (in S) are such that C $\subseteq$D, then V(S,C,P)$\leq$V(S,D,P).

3. Classical Case

In this section, we discuss what happens in the classical case in which we have only two possible and so complementary alternatives A_1, and A_2, and voters cannot abstain or be absent. In this section, we denote these two alternatives by 0 and 1: remember we have no abstention and so no possible misunderstanding for the symbol 0. We define:

12) Definition and observations

If we have only two alternatives respectively 0 and 1 and we have no possibility of abstention and absence:

a) if S=(s_1, ... , s_n), then by –S= (s'_1, ... , s'_n) we denote the dual of S, that is the situation such that s'_i=0 if s_i=1 and vice versa.
b) If C is a coalition in S, then by –C=N-C we denote the complement of C, and we note that C and -C are coalitions both in S and –S.

13) Observation

In the situation –S we have that all the players do "the opposite" of what they are doing in the situation S.
If we have only two alternatives, we note also that a partition in coalitions is of the following kind: P=(C_0,C_1,C_2), where C_0 is 0-active in P, C_1 is 1-active in P, and C_2 is the coalition of players that do not want to take a side. Moreover, if the players cannot abstain or be absent, then C_2 is empty, and so a partition in coalitions in this case is of the following kind: P=(C_0,C_1).

By this, suppose again that we have only two alternatives (0 and 1) and no possibility of abstention or absence; we give:

14) Definition

a) If P=(C_0,C_1) ∈ Pc(S), then –P stands for (C'_0,C'_1), where: C'_0=C_1 and C'_1=C_0. I.e. C_0 is 0-active in P and 1-active in -P, and analogous for C1. We have that -PIPc(-S).
b) The Gaaa G is classical if:
b.1) AL=Out(G) and |AL|=2;
b.2) Sit(G)={S: $\forall i \in N\ s_i \in \{0,1\}$ };
b.3) for every S, C and P: V(S,C,P) = V(-S,C,-P).

15) Observation

Suppose that in the game G we have only two alternatives and no possibility of abstention or absence, then the set of alternatives is simply AL= {0,1}. If the set of voters is N={1, … , n}, by definition it follows that the set Sit(G) is the set of all n-tuples of 0 and 1. Fixed a situation S, let be 1S={X∈N: sx=1 in S}, while 0S= {X∈N: sx=0 in S}. Then 0S =N-1S, and it is easy to prove that Sit(G) is (isomorphic to) the set of all possible pairs (1S, 0S), and also that the two sets {0S: S∈Sit} and {1S: S∈Sit} are isomorphic to P(N) (the power set of N).

16) Example

If N= {A, B} and AL={0,1}, then Sit={(0,0), (1,0), (0,1), (1,1) }. If S=(1,0) then 0S={B}, and 1S={A}, and the set {0S: S∈Sit}= { {A,B}, {B}, {A}, Ø}. Consider C={A}, there are only two situations in which {A} is a coalition in S: indeed {S: {A}∈Co(S)}={(1,0), (0,1)} and we have (1,0)= -(0,1), that is the situation (0,1) is the dual of the situation (1,0), and {A} is 1-active in (1,0) and 0-active in (0,1).

By the assumptions in points 12 and 14, the observation in 13, and generalizing the preceding example, we have:

17) Observations

If the Gaaa is classical (so in particular we have no abstention or absence), then:
a) given a situation S, we have that:
a.1) |Co(S)|=2; i.e. S determines just one pair of coalitions C_0, C_1, such that: C_0={i∈N: s_i=0}, and C_1={i∈N: s_i=1}. We have that C_0=N-C_1.

a.2) |Pc(S)|=1; i.e. S determines just one partition in coalitions, that is: P= (C_0,C_1).
b) A set C $\subseteq$ N determines just one situation and one partition in which C is 0-active:
b.1) the situation $S^0c=\{s_1, \ldots, s_n\}$, such that: $s_i=0$ « i $\in$ C, and 1 otherwise; and
b.2) the partition P^0c=(C,N-C).
c) Analogously C determines just one situation and one partition in which it is 1-active.
d) So s(C)=2.
e) If we have a partition P=(C_0,C_1), then C_0=N-C_1. So P determines:
e.1) just one situation $S=\{s_1, \ldots, s_n\}$ such that: $s_i=0$ « i $\in$ C_0, and $s_i=1 \leftrightarrow$ i $\in$ C1;
e.2) just one pair of coalitions.
f) By the preceding points, and point 14.b.3), we obtain that V=Mwc. Moreover, by points a)--c) here above we can write simply V(C) for V(S,C,P), and V corresponds to the classical characteristic function of a cooperative game. In different words, we can say that the win of C depends only on the coalition C itself and not on the situation or on the behaviour of the other voters.

Note that without condition V(S,C,P) = V(-S,C,-P), it is not possible to completely recover the classical case, since the function V depends not only on coalitions but, essentially, on the situation too as in the general case.

18) Definition

If the Gaaa is classical:
a) if in the situation S it happens that FR(S,P)=0, the set C={X $\in$ N: sx=0 } is a coalition in S and is said to be a winning coalition in the goal 0. Analogously if FR(S,P)=1;
b) if V(S,C,P)$\geq$V(S,C',P) for every C' $\in$ P, then we say that C is winning in value in S.

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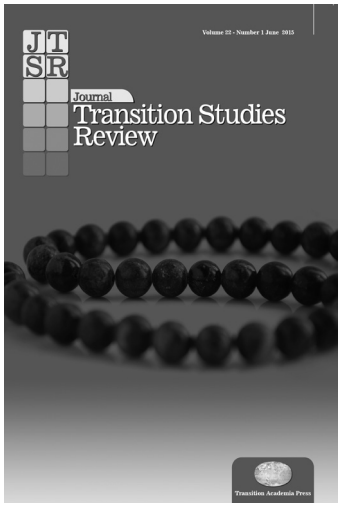

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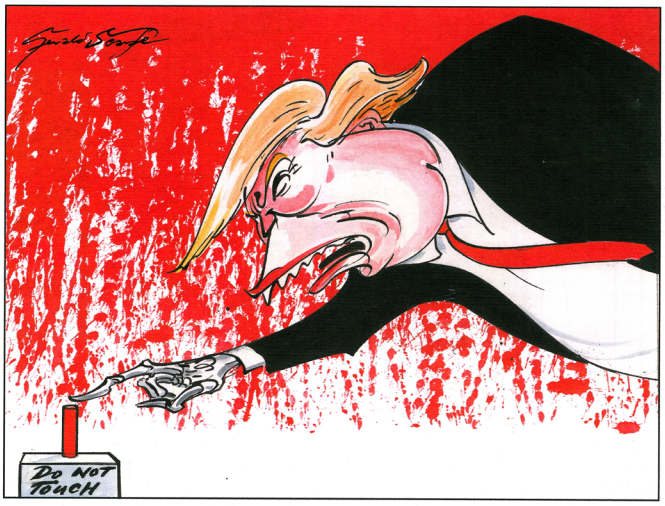

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