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CESIFO WORKING PAPER NO. 5667
CATEGORY 3: SOCIAL PROTECTION
DECEMBER 2015

ISSN 2364-1428

CESifo
Center for Economic Studies & Ifo Institute

CESifo *Working Paper No. 5667*

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Abstract

Do elderly workers retire early voluntarily, or are they induced (or even forced) by their employees? To establish the relevance of the labor demand component in retirement decisions, we consider a trade liberalization between Switzerland and the EU – the Mutual Recognition Agreement (MRA). A vast literature suggests that these trade liberalizations induce firms to relocations and to restructure, with large compositional effects on the labor market particularly for the elderly workers, who face higher mobility costs. Using Swiss Labor Force Survey data, we use a difference in differences approach to compare early retirement behavior in three periods (pre-liberalization, announcement, and implementation) for three groups of industries. MRA industries represent our treatment group; control groups are non-MRA manufacturing industries, and services. Our empirical results show that elderly workers are more likely to retire early in the MRA sector during the announcement period, and that the employment of young (30-years old) male workers increases. The distribution of wages by age is instead unaffected. Additional empirical evidence using Swiss Business Census and UN Comtrade data suggests that the increase in early retirement in MRA is not explained by more firms' exits, nor by more early retirement among the exiting firms. It is rather the surviving MRA firms, which react to the increase in competition by adjusting their labor force and use more early retirement.

JEL-Codes: J140, J230, J260, H550.

Keywords: early retirement, firms' restructuring, labor demand of elderly workers.

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December 3, 2015
We thank Eliana La Ferrara, Tommaso Nannicini, Giovanni Pica, Fabiano Schivardi, Till von Wachter, and seminar participants at CEPR-ECB Conference on "Labor supply in the aftermath of the crisis", at Bocconi University, at Università della Svizzera Italiana, at Boston College and at Center for Retirement Research, for useful comments. Usual disclaimers apply.

1 Introduction

For several decades after WWII, the labor market participation of (male) elderly workers has dramatically dropped. Meanwhile, longevity has experienced a spectacular increase. In the last two decades, however, this long run trend has been reverted, and retirement age in OECD countries has indeed started to increase. This new retirement behavior had long been advocated by experts and policy-makers as a key factor to restore the financial sustainability of unfunded pension systems. Yet, several open questions remain. Which factors contributed to the initial drop in retirement age and to the more recent change in the retirement behavior? Do individuals' retirement decisions exclusively depend on financial incentives, which affect the elderly workers' labour supply? What is the role of labor demand shocks? In other words, do employees induce, or even force, their workers to retire early?

Most of the economic literature on early retirement has concentrated on the labor supply, by emphasizing the crucial role of financial incentives [Gruber and Wise, 2008, Costa, 1998, Blöndal and Scarpetta, 1999] and retirement regulations [Mastrobuoni, 2009, Staubli and Zweimüller, 2013] present in the unfunded pension schemes. A political economy literature has analyzed the motivations behind the introduction of these features, which facilitate early retirement [Conde-Ruiz and Galasso, 2003]. Other contributions have examined the role played by other individual characteristics, such as health status [Currie and Madrian, 1999], joint retirement within couples [Hurd, 1990], or the existence of dependent elderly and grandchildren in the household [De Micco, 2015].

Despite survey evidence [Dorn and Sousa-Poza, 2010, Marmot et al., 2002] suggests that workers may not retire early voluntarily, but rather because they are induced by their employers, much less attention has been devoted to the role directly played by the firms in the retirement decisions. The seminal paper by [Lazear, 1979] provides the theoretical background for understanding the incentives that firms may have to terminate the job match with their elderly workers in normal times. With firms facing a reduction in the demand of their products or having to restructure, additional incentives to accommodate their elderly workers out of the labor marker may arise. In countries featuring strict employment protection legislations, high firing costs or steep seniority wages, early retirement may represent an affortable solution for the firm. Yet, the empirical evidence of this labor demand effect on early retirement is scant [Hakola and Uusitalo, 2005, Hallberg, 2011, Dorn and Sousa-Poza, 2010, Frimmel et al., 2015].

In this paper, we study the relevance of labor demand shocks in retirement decisions. We analyze how a trade liberalization that modifies domestic firms opportunities in domestic and foreign markets may affect the transition to early retirement among their elderly employees. We exploit a shock to the manufacturing sector in Switzerland, consisting of the introduction of a bilateral trade agreement with the EU, which enhanced

foreign market access for Swiss firms, and increased competitiveness on their domestic market. These trade liberalizations are known to induce important reallocation effects among firms, with an increase in both firms' entry and exit (see [Melitz and Trefler, 2012] for a review). Moreover, some existing firms may undergo a restructuring process in order to increase their degree of competitiveness (see [Bustos, 2011b]). This firm level reallocation process has a relevant impact on labor market outcomes, particularly for the elderly workers, who face higher mobility costs.

Our identification strategy relies on the sectoral variation embedded in the EU-Switzerland Bilateral Agreements I. In particular, we focus on one element of this Bilateral Agreement, known as the Mutual Recognition Agreement (MRA), which reduced trade barriers between Switzerland and the EU in some, but not all, industries in the manufacturing sector[1]. MRA provided mutual recognition of conformity test, thereby homogenizing packing and licensing. With the MRA, Swiss industrial products can reach the EU market faster and at a lower cost, as they only need to be tested once, in Switzerland. And viceversa for EU products. The agreement reduced costs considerably for Swiss and EU export-oriented firms[2]. This Mutual Recognition Agreement did not affect other industries in the manufacturing sector, nor in the service sector. The Bilateral Agreements I was signed in 1999. The agreement was approved by the Swiss citizens in 2000 with a referendum, and was finally implemented in June 2002.

The timing of the agreement and its sectoral variation allow us to identify a treatment group of industries in the manufacturing sector, and two control groups – the unaffected industries in the manufacturing sector, and the service sector. Firms in the sectors affected by the MRA[3] have the potential of facing a larger (EU) market, than the control groups. However, they also face a more fierce competition on their domestic market. The existing literature, reviewed at section 2, suggests that these liberalizations produce both within-sector reallocation and within-firm productivity changes, with large compositional effects on the labor market – particularly for the elderly. We also distinguish between two treatments: an announcement effect, which may have occurred between the signature of the agreement in 1999 and its implementation in 2002; and the implementation effect since 2002. During the announcement period, firms in the affected manufacturing industries may have chosen to undergone a restructuring of their

[1] Analogous agreements, which involved the selection of specific industries, had already been signed by the EU with other countries, such as Canada and the United States. Hence, lobbying activity of Swiss interest groups did not play a role in the selection of industries covered by the MRA. In section 4, we compare the observable characteristics of these two sectors before the agreements.

[2] A list of industrial products for which the MRA between the EU and Switzerland is operational is presented in the appendix.

[3] This trade liberalization episode has been analyzed in [Buehler and Burghardt, 2015], in [Buehler et al., 2011] and in [Helm, 2013]. The authors study the effect of the reform on plant's probability of being vertically integrated, on employment growth and on exit rates of firms, respectively.

labor force to increase their degree of competitiveness both on the domestic and on the EU market. Other firms may instead have exited the market [Costantini and Melitz, 2007]. Once the implementation took place, in 2002, the more efficient firms were able to exploit this enlargement opportunity. Some firms moved from the domestic to the exporting sector. But other domestic firms, which found out to be less productive, closed. We will thus provide a diff-in-diff that exploits these two thresholds: 1999 and 2002.

Our main goal is to study the effects of these labor demand shocks on the retirement behavior of male individuals aged between 59 and 64 years. The Swiss pension system may allow these individuals to retire early on second pillar pensions, even if eligibility for first pillar pensions from the public unfunded scheme has not been reached yet. We also analyze the age composition of the employment in these different industries, and the possible impact on the average wage by age. We then study two different channels that may allow trade liberalizations to induce early retirement: closure of existing plants, and firms' internal restructuring.

To address these issues we use three distinct dataset. Information on the individual retirement decisions are obtained from the Swiss Labor Force Survey – a rotating panel with up to five interviews per person, which covers a representative sample of the Swiss population, and provides information on workers' individual (sex, age, education level, current wage) and on firms' (industry, location and size) characteristics. Our sample consists of 2,359 male individuals aged 59-64, in 1992-2005. Data on firms' dynamics, such as number of plants and firms' entry and exit, can be found in four waves of the Swiss Business Census (1995, 1998, 2001, 2005), which covers the universe of plants in the manufacture and service sectors in Switzerland – corresponding to about 300,000 firms. Finally, information on the degree of competition by industry, as measured by import and export prices, can be calculated using the UN Comtrade Database, which reports values and quantities of commodities imported into and exported from Switzerland in 1996-2005.

Our empirical results show that the labor demand shock induced by the trade liberalization between the EU and Switzerland led to important changes in the age structure of the workforce. Elderly workers were more likely to retire early in the affected manufacturing industries during the announcement period, and the employment of male individuals in their thirties increases. The wage structure by age was not affected by the trade liberalization. Our empirical evidence suggests that the channel at work is firms' restructuring in the MRA sectors. In fact, we find no evidence that firms are more likely to exit in the affected sectors. Moreover, the use of early retirement in closing firms does not differ between MRA and non-MRA sectors. On the other hand, export prices dropped in the MRA sectors – suggesting that competition indeed increased; and the use of early retirement in surviving firms is larger in MRA sectors. These evidence are consistent with firms in the affected sector undergoing a restructuring process of their

labor force which led to early retirement in the period between the signature of the agreement and its actual implementation, and to changes in the age composition of the work force.

The paper is structured as follows. Section 2 discusses the literature on trade liberalization and retirement. Section 3 describes the Swiss institutional framework. Section 4 presents the methodology and the results of our empirical analysis. Section 5 explores the different channels of transmission from trade liberalization to early retirement. Section 6 concludes.

2 Trade Liberalizations and Retirement

How do trade liberalizations, such as the Mutual Recognition Agreement introduced during the Bilateral Agreements between Switzerland and the EU, matter for early retirement decisions? The Mutual Recognition Agreement reduced trading costs for the affected sectors. The existing theoretical literature (see [Melitz and Trefler, 2012] for a review) suggests that this trade liberalization leads to important firm-level reallocations, which trigger changes in labor market outcome, such as employment and wages, with relevant heterogenous effects.

The within sector reallocation that follows a trade liberalization induces sorting among existing firms [Melitz, 2003, Bernard et al., 2003]. Domestic firms will relinquish part of their domestic market, due to the increase in internal competition induced by the entrance of foreign firms, and the less productive firms will be forced to exit the market. This will lead to fewer domestic firms. On the other hand, the more productive domestic firms will have an incentive to enter into exports. Moreover, new (productive) firms will find profitable to enter the market, and in particular the export sector. Trade liberalizations are thus associated with churning, as the volume of firms both exiting and entering the markets increases. Trade liberalizations have also been recognized to stimulate within-plant changes in productivity [Verhoogen, 2008, Lileeva and Trefler, 2010, Bustos, 2011a, Aw et al., 2011]. By reducing the cost of access to foreign markets, they provide an incentive for firms to innovate in order to succeed in exporting.

The empirical literature has largely validated these effects. Evidence of inter-firm reallocation (see [Greenaway and Kneller, 2007, Wagner, 2007] for a survey) includes increases in exit rates of domestic firms [Baggs, 2005, Baldwin and Gu, 2006, Lileeva, 2008, Bernard et al., 2006], and entry of more productive firms into exports [Lileeva and Trefler, 2010]. Furthermore, studies of the US-Canada tariff reduction agreement show a reduction in the entry rates of low productivity plants after the agreement [Melitz and Trefler, 2012] and find an increase in productivity at industry level after agreement with no productivity gains at plant level [Trefler, 2004]. These results are suggestive of selection effects. Additional evidence in favor of this reallocation effect are in [Bernard

and Jensen, 2004] and [Pavcnik, 2002]. Other empirical studies have analyzed changes in within-plant productivity that followed trade liberalizations (see [López, 2005], for a survey). Evidence that trade liberalizations, by improving export opportunities, led firms to invest in productivity and to innovate are in [Lileeva and Trefler, 2010, Baldwin and Gu, 2004, Lileeva, 2008, Van Biesebroeck, 2005]). Lileeva and Trefler [2010] uncover also heterogenous effects: among the plants that begin to export after the liberalization, the largest gains in productivity are for those which were initially least productive. Closely related to our study, [De Loecker, 2007] shows that entry into the EU induced Slovenian firms to innovate, in order to take advantage of the new trading opportunities. Additional supporting evidence are in [Bustos, 2011a], and [Aw et al., 2011].

As a consequence of these firm and industry level effects, trade liberalizations have also an impact on labor market outcomes. [Bustos, 2011b] finds that a free trade agreement in Argentina, by inducing exporters to update technology, determined a skill upgrading and an increase in the relative demand of skilled labor.[Verhoogen, 2008] proposes an additional mechanism through which trade affects labor: quality upgrading mechanism. The Mexicas peso devaluation in 1994 induced more productive firms to produce a larger share of higher-quality goods and, in order to have a better workforce, to pay a higher wage. As a result, the within-industry wage dispersion increased. Other evidence of a positive effect of the trade liberalization on average wage and on wage inequality are also in [Revenga, 1997, Harrison and Hanson, 1999] and [Amiti and Davis, 2012].

In this paper, we are interested in analyzing how trade liberalizations, such as the Mutual Recognition Agreement, may affect early retirement behavior. By inducing churning, trade liberalizations are likely to impose a large adjustment burden on older workers. The within and across sector reallocation of firms entails more exits of existing firms – and thereby more firing – as well as more entry of new firms – and hence more hiring. However, the reallocation from job to job has proved more difficult for the displaced elderly workers. Several contributions have in fact emphasized that elderly workers acquire firm or industry specific human capital [Rogerson, 2005], make irreversible occupational choices [Matsuyama, 1992], or may have strong reasons not to move, such as owning a house or having a spouse working in the same location [Groot and Verberne, 1997]. Additionally, the within-plant changes in productivity induced by the liberalization may have negative implications for the elderly workers, since the process of skill upgrading typically affects the age composition of the labor force. Overall, the cost from trade liberalization for the elderly workers, in terms of higher probability of being unemployment and/or lower wages, are estimated to be substantial [Artuç, 2012, Dix-Carneiro, 2014]. Hence, some of these elderly workers may turn to welfare programs. In fact, individuals living in the geographical areas, which are most affected by the import competition, are also shown to rely more on welfare transfers [Autor et al.,

2013] . Yet, few studies have explicitly analyzed the impact of trade liberalizations on the retirement decisions of the elderly workers. [Fries, 2014] finds that the EU Eastern enlargement in 2004 did not have age biased employment effects in Germany, although it did penalize low and medium skilled workers in terms of job destruction.

Age-biased technological changes need not to be induced by trade liberalizations, but may still affect retirement. Profit-maximizing firms facing demand or technological shocks may find optimal to offer generous early retirement provisions to their elderly employees in order to induce them to quit (see [Hutchens, 1999], for a theoretical framework, and [Bartel and Sicherman, 1993, Hujer and Radic, 2005] for supporting evidence). However, training and organizational innovation may help elderly workers in the presence of technological shocks [Bartel and Sicherman, 1993, Aubert et al., 2006]. The extent to which firms rely on early retirement provisions depends on labor costs and labor market institutions, but also on how much firms internalize the retirement cost. Empirical evidence shows that a rise in the non-wage labor cost increases the retirement rate [Hallberg, 2011]; firms with higher labor costs feature a lower retirement age among their workers [Frimmel et al., 2015]; and recessions in countries featuring a strict employment protection legislation are associated with a higher share of involuntary retirement [Dorn and Sousa-Poza, 2010]. On the other hand, the introduction of partial experience rating in unemployment benefits for large Finnish firms reduced the unemployment risk of their older workers [Hakola and Uusitalo, 2005].

This vast theoretical and empirical literature on the effects of trade liberalization thus suggests that the Mutual Recognition Agreement between Switzerland and the EU represents an important labor demand shock that may have significant consequences for early retirement. We will examine these effects in section 4, and analyze the channels of transmission in section 5.

3 Institutional Background

In this section, we provide some basic information on the history of the institutional relations between Switzerland and the EU, and some data on the magnitude of their trade flows. How Swiss firms – and workers – adjusted to the external demand shock induced by the trade agreements largely depends on the characteristics of the Swiss labor market, and on the pension system. These aspects are discussed later in the section.

3.1 Switzerland and the European Union

The extent to which the trade liberalization policy, which occurred with the Mutual Recognition Agreement, is relevant to the Swiss labor market crucially depends on the magnitude of the trade flows between Switzerland and the EU. Switzerland is one of

the four most important trading partner for the EU, while the EU is by far the most important trading partner for Switzerland. The initial basis of economic relationship between Switzerland and the European Union was placed in 1972 with the approval of the Free Trade Agreement, which eliminated quotas and customs duties on industrial goods. Twenty years later, with a referendum in 1992, the Swiss electorate declined to join the European Union. As a result, the Swiss Federal Council decided to pursue its economic relations with the EU on a bilateral basis, following a pattern that other countries, such as the US and Canada, had already undertaken. Two packages of bilateral agreements were negotiated and signed respectively in 1999 and in 2004.

The Bilateral Agreements I signed by the EU and Switzerland in 1999 includes seven treaties. These Agreements were approved by the Swiss electorate in 2000 and were then enacted in 2002. The seven agreements pertains the free movement of persons, mutual recognition agreement (MRA), public procurement markets, agriculture, overland transport, civil aviation and research. These agreements, together with the initial Free Trade Agreement, ensured easier access to the European Market for Swiss companies, and viceversa.

In this paper, we exploit the variation in the trade opportunities induced by the MRA. The MRA simplifies the admission of products in Switzerland and in the European Union by providing for the mutual recognition of conformity assessment issued by recognized EU and Swiss authorities. Since the MRA was signed in 1999, but it was implemented only in 2002 – after the approval of the Swiss electorate with a referendum, in our empirical analysis we will distinguish three periods: before the agreement (up to 1998), an announcement period (1999-2001) and an implementation period (from 2002). This time structure will allow us to test the existence of announcement effects in the trade liberalization (see [Costantini and Melitz, 2007]). Figures 1 and 2 show the trend of the Swiss imports and exports – as share of GDP – towards the EU countries (EU15), for MRA and non-MRA sectors, from 1996 to 2005. [4]

The second group of agreements, the Bilateral agreements II, were signed in 2004 but the time of implementation differs across single agreements. These treaties extend political cooperation to other areas, such as culture, pension and environment.

3.2 The Swiss Labor Market and Pension System

The labor demand of elderly workers, and the extent to which firms may instead find convenient to retire elderly workers, depends on several features of the labor market. In particular, steep seniority wages increase the cost for the firms of retaining elderly workers, at times when their productivity drops. Yet, tight labor market regulations

[4]For these two figures product-level data from the UN Comtrade database are used. We follow the procedure described in Section 5.2 to classify the HS product codes into our two groups of industries.

may make it costly for firms to dismiss them. The Swiss labor market is characterized by strong seniority wages [OECD, 2011]: the labor earnings of males aged 55-59 is in fact 50% higher than those of male workers in the 25-29 age group. Compared to other OECD countries, Switzerland is in the same range of Italy or the US, but higher than most Scandinavian countries (around 25% higher wages for the elderly) and than UK and Australia (around 15%). On the contrary, the degree of labor market regulation, as measured by the OECD's Employment Protection Regulation index, is rather low: around 1.6 for regular workers – thereby higher than in the UK (1.1) or the US (0.25), but substantially lower than in Italy, France or Germany (between 2.4 and 2.7). Despite the high labor cost for the elderly workers, and the flexibility of the labor market that would allow for easy dismissals, Swiss firms tend to refrain from massive dismissals of costly elderly workers, in part due to social concerns. Firms involved in within-plants reallocation, which affects the age composition of the labor force, prefer to induce workers to use early retirement options. Individuals' responses to a question on the reasons for taking early retirement, which was asked in the 2002 and 2005 waves of the Swiss Labor Force Survey, confirm this fact. The most common reason for early retirement among male workers was company reorganization (21.6%), followed by bad health (16%), and leisure motives (14%). Overall, employers driven motivations – namely, company closed down, company reorganization, and attractiveness of the retirement package offered by the employer – accounted for more than one third of the early retirement.

In Switzerland, retirement may give access to two types of pension benefits, since the pension scheme is based on two pillars. The first pillar consists of the state-run basic PAYG old age system. This scheme is mandatory for all employees, self-employed, and unemployed individuals over the age of 20. This unfunded system is financed by payroll taxes, which amount to 9.8% of the individual's labor market income. The general retirement age is currently 65 for men and 64 for women. The normal retirement age for women was raised in two steps from 62 to 63 years in 2001, and to 64 years in 2005. The option of drawing an early retirement pension was introduced in the system in 1997, with the 10th AHV revision. After this reform, individuals were allowed to claim benefits up to one year (and after 2001 to two years) prior to the general retirement age. The benefits are actuarially adjusted in case of early retirement. Pension benefits are reduced by an amount between 3.4% and 6.8% for each year of early withdrawal. On the other hand, pension benefits increase by over 5.2% per year if a pension is drawn after the normal retirement age (but within a five year period).

The second pillar consists of fully-funded company pension plans. They are compulsory for these employees, whose income exceeds a minimum threshold. Employees, whose income is below the threshold, and self-employed persons can, however, also opt to self-insure. The total contribution to be shared between employers and employees amounts on average to 17% of the individual wage. The minimum age of entitlement

varies across pension plans. However, many plans allow early retirement, by offering an option for early withdrawal from employment at actuarially fair reductions. Other private plans may even provide supplementary pensions to bridge the gap until the individual is eligible to receive her public first pillar pension. On average, the observed retirement in occupational plans is substantially below the statutory age even in funds that do not explicitly subsidize early retirement [Bütler et al., 2004].

4 Empirical Analysis on Early Retirement

4.1 The data

In our analysis, we use data from the Swiss Labor Force Survey (SLFS). Since 1991, the Federal Statistical Office has conducted the SLFS on an annual basis. It is a rotating panel with up to five interviews per person and covers a representative sample of the Swiss population. The data provide information on sex, age, education level, and current wage, as well as detailed information on industry, location and size of the firm in which the individual is/was employed. In particular, the industry is identified by the NOGA 2002 (Swiss) classification[5]. We use the Directive 98/37/EC, as provided in EC (2002) and EC (2003), to match the sectors covered by the MRA with the corresponding four-digit industries of the NOGA code (see also [Buehler and Burghardt, 2015]).

In this empirical analysis, we concentrate on three outcomes of interest: early retirement, and employment and wages by age groups. We choose to cut the data in two ways. First, we use the data at individual level by considering individual retirement and wages. Second, we aggregate the data at 4-digit NOGA industry level to study the effect of the Mutual Recognition Agreement on the share of early retirees, on the share of employed by age and on the average wage by age in each industry.

To analyze the individual retirement behavior, we use a sample of about 2359 male with age varying between 59 and the prevailing normal retirement age in the years 1992-2005 (as discussed in section 3.2). We follow the existing literature and consider retirement as an absorbing state; thus we censor observations after retirement. We define retirement to occur when an individual aged from 59 to 64 (or in general aged one year less than the normal retirement age) is currently out of the labor force, but was working in the previous year. We concentrate on male workers only, both because social security requirements for women are less stringent and have been modified over the time span of our analysis, and because of the existing upward trend in female labor force participation. To analyze the impact of the change in trade policy originated by the Bilateral Agreements on the probability of early retirement, we identify male individ-

[5]The classification used in the EU, which corresponds to the Swiss 4-digit NOGA, is the 4-digit NACE.

uals employed in industries which were subject to the Mutual Recognition Agreement (MRA) as the treatment group and we compare them to two control groups composed of individuals employed in manufacturing industries which were not covered by the MRA (non-MRA) or in the service sector [6]. Table 1 (Panel 1) provides the summary statistics for our variables of interest over the entire 1992-2005 period for these three groups. For the period prior to the approval of the Bilateral Agreements (1992-1998), Table 2 compares the descriptive statistics for MRA vs non-MRA group in Panel 1, and for MRA vs services in Panel 2. These groups do not differ in terms of age of individuals, share of foreigners and married individuals in the years prior to the shock, but individuals in the treatment group are more educated than those in the non-MRA industries, and employed in larger firm plants than those in both control groups. We will control for these variables in our regressions.

Besides the early retirement behavior, the churning induced by the trade liberalization may also affect employment and wages by age groups. To examine these effects, we consider a sample of 65,898 male individuals aged 18 to 64 for the 1992-2005 period. As before, individuals employed in industries subject to the Mutual Recognition Agreement (MRA) belong to the treatment group, which we compare to our two control groups – non-MRA and services. Table 1 (Panel 2) provides the summary statistics for our variables of interest over the entire 1992-2005 period for these three groups.

Then we turn to the analysis with data aggregated at industry level. In particular, we use 4-digit NOGA 2002 classification of industries to obtain measures of the share of early retirees in each sector, and of share of employed by age and on the average wage by age in each sector. For the latter two measures, we use four age groups, namely younger than 29, 30-39, 40-49 and 50+. The summary statistics are reported at table 1 (panel 3). To pursue this industry level analysis for the share of employed and the average wage by age, we have to consider that for some industries we have only few workers in our dataset. To address this issue, we proceed in two steps. First, we aggregate the annual observations into four periods[7]: 1992-95, 1996-98, 1999-2001, 2002-05. Second, we drop from the sample those industries which have no male workers in at least one of the four periods, and then the bottom 25% of the 4-digit NOGA industries by employment in the first period (1992-95) – which correspond to those with less than 12 male employees. This procedure reduces the total number of (4-digit) industries in our sample from 273 (of which 60 in MRA, 94 in non-MRA and 119 in services) to 187 (of which 37 in MRA, 60 in non-MRA and 90 in services). For the industry analysis of the share of early

[6] In the service group, we do not include the following industries: Trade Vehicles, Whole and Commission Trade, which may be affected by the MRA; Public administration, Education, Health, which may include non-profit oriented firms and Private Household.

[7] The first two periods thus correspond to the period before the Mutual Recognition Agreement, the third period coincides with announcement period and the forth with the implementation. See discussion at sections 4.2 and 4.3.

retirees, we still aggregate the annual observations into the four periods as described above, but we keep all those industries for which we have at least one potential retiree for each of the three phase defined in the next paragraph (namely, in 1992-1998, *Before* the Bilateral Agreements were signed; in 1999-2001, during the *Announcement* period; and in 2002-2005, *After* the implementation). This procedure reduces the sample to 137 industries (of which 28 in MRA, 38 in non-MRA and 71 in services).

4.2 Descriptive Evidence

The retirement dynamics in the MRA and non-MRA industries and in the services can be appreciated at figures 3 and 4, which display the early retirement behavior in these three groups. The vertical bars are suggestive of the three time periods of interest: 1992-98 represents the pre-treatment period, i.e., before the announcement; 1999-2001 is the announcement period; and 2002-2005 is the implementation period. A visual inspection suggests that early retirement was more widely used in MRA manufacturing industries with respect to the two control groups (non-MRA manufacturing industries in figure 3, and service sector in figure 4) during the announcement period, and particularly in 1999 and in 2000. No substantial differences instead emerge during the implementation period. The same picture emerges by looking at the share of early retirees by industry. Figures 5 and 6 show a large increase in the share of early retirees at announcement in the MRA industries with respect to both non-MRA industries and services, which is consistent with the evidence obtained using individual data.

Table 3 summarizes levels and changes in the average early retirement rate across the three groups of industries in the pre-treatment, announcement and implementation period. These averages are calculated using data in the years before the Bilateral Agreements were signed (years 1992-1998, *Before*), in the years between the signature and the implementation (1999-2001, *Announcement*), and in the years after the implementation (2002-2005, *After*). The statistics in Panel 1 show that Before the treatment period the probability of opting for early retirement was on average the same in the treatment and in the control group. In the Announcement period, a significant difference emerges across groups, due to a large increase in early retirement in the treatment group. After 2002, i.e. in the implementation period, the difference disappears as early retirement in the treatment group decreases. In Panel 2 we look at the second control group: services. In this case, there is some evidence of more early retirement in the control group in the Before period. This difference is completed reverted during the Announcement period, because of the large increase in early retirement in the treatment group. And it goes back to the initial situation after 2002, during the Implementation period.

4.3 Empirical Strategy

To investigate the impact of the change in trade policy on the labor market variables of interest, we use a difference in differences estimation approach, which compares the pre-treatment period (1992-1998) to the announcement period (1999-2001) and to the after implementation period (2002-2005). First, we run individual-level regressions and compare the changes in the probability of opting for early retirement across the two groups of individuals for these three periods using a linear probability model. We also use individual data on log wages by age to identify the possible effect of the MRA on wages. Second, we run industry-level regressions to compare the outcome of interest – share of early retirees, employment and hourly wages by age group – across the treatment and the control groups for these three periods using a linear probability model.

The baseline difference in differences estimator is of the form:

$$Y_{it} = \alpha + \gamma Treat_i + \varphi_1 Ann_t + \varphi_2 After_t + \beta_1 Treat_i * Ann_t + \beta_2 Treat_i * After_t + \delta X_{it} + \varepsilon_{it} \quad (1)$$

where Y_{it} is the outcome of interest, the variable $Treat_i$ accounts for average permanent differences between treatment and control group, whereas Ann_t and $After_t$ captures the temporal trends common to both groups during the announcement and the implementation period. $Treat_i * Ann_t$ and $Treat_i * After_t$ are the interaction terms between the two respective dummies and measure the true effect of the respective treatments: announcement and implementation. X_{it} is a vector of covariates controlling for firms' and individuals' or industries' characteristics. In the individual regressions, we include dummies for self-employment, size of firm[8] in which the individual is employed, age, education level[9], marital status, macro-region of residence[10] and whether the worker is Swiss or foreign. In the industry level regressions, we include the share of foreigner workers, the share of married individuals, the share of employment by firm size class, the share of graduate workers, and share of workers by macro-region of residence and their average age (except in the analysis of the employment share by age). Finally, ε_{it} is an error term. We present different specifications, in which industry, year and region fixed effects are used. Standard errors are clustered at industry level.

[8] We consider five different levels of firm size (n).The variable is equal to 1 if $n <= 10$; = 2 if $n > 10$ and $n < 20$; = 3 if $n >= 20$ and $n < 50$; = 4 if $n >= 50$ and $n < 99$; = 5 if $n > 99$;

[9] The variable is equal to 1 for individuals with primary or lower secondary education, to 2 for those with upper secondary education and 3 for postsecondary and tertiary education

[10] Seven macro-regions are identified. Macro-region 1 includes Vaud, Valais, and Geneva; macro-region 2 includes Bern, Fribourg, Solothurn, Neuchâtel, and Jura; macro-region 3 includes Basel City, Basel Land, and Argovia; macro-region 4 includes Zurich; macro-region 5 includes Glarus, Schaffhausen, Appenzell O. Rh., Appenzell I. Rh., St. Gall, Grisons, and Thurgovia; macro-region 6 includes Lucerne, Uri, Schwyz, Nidwald, Obwald, and Zug; macro-region 7 includes Ticino.

The difference-in-differences approach requires a common trend assumption. In the absence of the trade agreements, the difference in the outcome between the treatment group and the two control groups should have been the same. We can test for differences in the pre-treatment trends between the treatment and control groups. Table 4 presents the results of the regressions in which, for the individual early retirement decision, in the pre-treatment (1992-98) period, we compare the year by year difference between treatment and control group respectively in MRA vs non-MRA and MRA vs services. No significant difference emerges.

Tables A1 to A4 in the appendix present the results for the individual wage by age and those of a similar exercise for the other variables of interest (share of early retirees, employment share by age, and hourly wages by age) when the data are aggregated at industry level and in four time periods (1992-95, 1996-98, 1999-2001, and 2002-05). In these last three cases, testing for differences in the pre-treatment trend between treatment and control groups amounts to a comparison of the first two periods. Results at tables A1 to A4 suggest that there are no differences in the pre-treatment period, with some exceptions for the hourly wages regressions with individual and industry level data.

4.4 Results at Individual Level

Table 5 presents our estimation results related to the individual retirement behavior. We analyze the announcement and implementation effect of the Bilateral Agreement by comparing the early retirement behavior in the treatment group (MRA manufacturing industries) with our control groups: non-MRA manufacturing industries in columns (1) to (3), and services in columns (4) to (6). Columns (1) and (4) report the estimates of the equation 1 with no control variables and only age fixed effects; in columns (2) and (5), control variables, year and region fixed effects are included, and in columns (3) and (6) the results of the specification including also firm size and industry dummies are reported. Standard errors are clustered at the 4-digit industry level.

The comparison on retirement behavior in firms belonging to MRA versus non-MRA manufacturing industries shows that more early retirement takes place in the affected sectors during the announcement period. In fact, the coefficient on the interaction term *Treatment*Ann* is statistically significant and positive in all columns (1) to (3). The signature of the agreement is indeed associated with an increase of approximately 8.6% in the probability of early labor force withdrawal. Instead, the coefficient on the interaction term *Treatment*After* is never statistically significant: the actual implementation of the MRA does not seem to affect the probability of early labor force withdrawal. The same results emerge from columns (4) to (6), where the difference between the treatment group and the second control group – services – is reported. The coefficient on the interaction term *Announcement*After* is again statistically significant and positive; whereas the

coefficient on the interaction term *Treatment*After* is never statistically different from zero. In line with the dynamics of the individual early retirement behavior shown at figures 3 and 4, these results suggest that the firm dynamics taking places in the MRA sector at the time of the announcement is associated with a substantial increase in early retirement.

To further examine these effects, we can exploit the individual data for the sample of male individuals aged 18 to 64 in the 1992-2005 period. In particular, we construct the kernels of the male workers' distribution by age in the MRA, non-MRA and services in 1998, 2001 and 2004, corresponding respectively to the last year prior to the announcement, to the last year prior to the implementation and to last year prior to the Bilateral Agreements II. For the treatment group, these three distributions are suggestive of the age composition prior to the trade agreement, after an initial adjustment induced by the announcement has taken place, and after the adjustment driven by the implementation has had time to become effective. Figure 7 compares MRA to non-MRA, while figure 8 shows MRA vs services. In 1998, the age distributions in the MRA and non-MRA were very similar (there is no significant difference according to the Kolmogorov Smirnov test), but they diverged in 2001, as the share of elderly workers decreased and the share of individuals in their thirties increased relatively to the non-MRA sector; and remained different in 2004. A comparison between MRA and services suggests instead that the age distributions in these two groups were initially somewhat different (although not significantly different according to the Kolmogorov Smirnov test) in 1998, but they become increasingly similar in 2001 and 2004.

In table 6, we test whether the churning induced by the trade liberalization had an impact on individual wages. For four age groups (18-29, 30-39, 40-49 and 50-64), we compare individual wages in the treatment group (MRA manufacturing industries) versus our control groups: non-MRA manufacturing industries in columns (1) to (4), and services in columns (5) to (8). The results suggest that individual wages were not affected.

4.5 Results at Industry Level

To analyze the impact of the Mutual Recognition Agreement on the labor market outcomes, we aggregate our data at industry level, as described at section 4.1, and investigate the impact on the share of early retirees, on employment share by age and on the average wages by age.

As shown at table 7, and in line with the dynamics at figures 5 and 6, the share of early retirees increases in MRA industries at announcement both when compared with non-MRA industries (columns 1 and 2) and with services (columns 3 and 4). Table 8 presents the results of our diff-in-diff specification described at eq. 1 for the employment share of the male workers in four age groups (18-29, 30-39, 40-49, and 50-64), by com-

paring the treatment group (MRA) respectively with the non-MRA in columns (1) to (4), and with the services in columns (5) to (8). A strong increase in the share of male workers in their thirties emerges both at announcement and at implementation in the MRA. Whereas employment drops at implementation for younger workers (18-29).

Table 9 reports the results for the hourly wages by age when the control groups are respectively non-MRA – columns (1) to (4) – and services – columns (5) to (8). In the former case, our regressions show that the hourly wages of the elderly workers drop at announcement in the MRA with respect to the non-MRA industries, while the hourly wages of the young drop at implementation. Instead, no change in the hourly wage by age between MRA and services is induced by the trade policy. Overall, and in line with the results at table 6, the effect of the trade liberalization on wages seems at most marginal.

Taken together, the empirical evidence on early retirement, employment rate and wages by age displayed at figures 3 to 8 and at tables 5 to 9 suggests that firms in MRA industries reacted to the trade policy by reducing their demand of elderly workers. In the next section, we will exploit additional data to shed some light on the mechanisms behind this effect.

5 Exploring the Channels

Our empirical evidence shows that, in the sectors affected by the Mutual Recognition Agreement, more elderly workers retire early, and the employment rate of workers in their thirties increases. These labor market effects of the trade policy may be triggered both by the potential increase of foreign competition in the domestic market and by the opening of foreign markets to domestic firms. More competition in the domestic market leads some domestic firms to exit the market, while others may be induced to restructure. Restructuring may also be needed in order to exploit the enhanced opportunities on the foreign markets. The increase in the use of early retirement in the sectors mostly affected by the trade policy may hence be attributed to different mechanisms. On one hand, more foreign competition in these sectors may cause the closure of domestic firms, which therefore release all workers and induce the displaced elderly workers to use early retirement options. On the other hand, more foreign competition and better opportunities in the foreign markets may push firms to restructure in order to gain competitiveness. This may be achieved (see section 2) by pushing elderly workers towards retirement and by substituting them with younger, more productive, but still experienced workers.

To tell apart these two different channels – namely firms' closure and firms' restructuring – we exploit two additional data set on firms' behavior and trade prices. The Swiss Business Census data allows us to analyze whether the introduction of the Mutual

Recognition Agreement affected the entrance of new firms and the closure of existing ones. The UN Comtrade database has data on import and export prices, which can be used as an indirect measure of competitiveness. Finally, the dataset used at section 3 can be exploited to assess the correlation between firm closures and early retirement.

5.1 Firms' Dynamics

To analyze the firms' dynamics, we use four waves of the Swiss Business Census (1995, 1998, 2001, 2005). This dataset covers the universe of plants with more than 20 weekly aggregate working hours in the manufacture and service sectors in Switzerland. The census is compiled by the Swiss Federal Statistical Office and firms' participation is mandatory. The dataset contains detailed information on location, sector of activity, number of employees (as well as their gender and nationality) of about 300,000 firms.

To examine the firms' dynamics – namely, entry and exit – by sectors, we aggregate our observations up to the 4-digit NOGA industry level [11] and classify the industries in our three groups (MRA, non MRA, Services). We focus our analysis on a balanced panel of industries, which are present in all four waves. Our panel consists of 462 industries: 87 in MRA, 134 in non-MRA and 241 in services.

Table 10 shows the descriptive statistics for number of plants, entry and exit rates in treated and control industries. The entry (exit) rate is measured by the number of entering (exiting) establishments between two subsequent census waves as a percentage of the total number of establishments in the initial period. Hence, by construction, entry and exit rates are not available for the 1995 wave. Our empirical analysis uses the specification at equation 1 to test whether number of plants, entry and exit rates differ between treatment (MRA) and control groups (non-MRA and services) in the announcement and implementation periods. The results displayed at table 11 show that the number of plants increased in the treatment group (with respect to the non-MRA sector) in the implementation periods. There is no evidence of a differential effect on the entry rates (both with respect to non-MRA and services) and exit rate (with respect to the non-MRA sector). When comparing firms in the MRA sector with the control groups, we can thus rule out the hypothesis that the increase in foreign competition led to more firms' closure in MRA.

5.2 Price Dynamics

To test whether the level of competition in the MRA sector has increased (vis-a-vis the non-MRA sector) after the trade liberalization, we use data from the UN Comtrade

[11] Since the industry classification used in this dataset is the NOGA 2008, we use the correspondence table from the Swiss Federal Statistical Office to convert the NOGA 2008 code into its previous version (NOGA 2002).

Database, which reports values and quantities for the commodities that Switzerland imported and exported over the period 1996-2005. These trade flows are recorded according to the six-digit Harmonized System (HS) product classification. In order to classify these products into our two groups of industries (MRA and non-MRA), we need to map the HS codes into the 4-digit level 2002 NOGA codes. We proceed as follows. First, we convert the earlier version of HS into the 2002 HS, via HS conversion keys. We then use a one to one correspondence table from the World Integrated Trade Solution to match the HS2002 to the ISIC Rev 3; and finally we convert ISIC Rev3 to NOGA 2002 using a concordance table provided by UNCTAD. We drop the products, whose ISIC code maps to more than one NOGA industry.

We compute export and import unit values, defined as total value divided by units in kilograms, for each commodity. We keep only those products that do not have any missing values for both variables, and that are present over the entire period of analysis. In the end, we obtain a balanced panel of 3152 HS products, of which 1601 in MRA and 1551 in non-MRA.

Table 12 presents the descriptive statistics for quantities, values and unit values in US dollars for import and export goods. Again, our empirical analysis refers to the specification at equation 1, but now the time period spans from 1996 to 2005. Hence, we can test whether (the logs of) import and export unit values differ between treatment (MRA) and control groups (non-MRA) during the announcement (1999-2001) and implementation (2002-05) periods, but also whether the common trend hypothesis is satisfied prior to the treatment (i.e., for 1996-98). The results at table 13 show that export unit prices in the MRA start to decrease during the announcement period, and continue to drop during the implementation. No significant effect emerges instead for the import price. These price dynamics thus suggest that an increase in competitiveness in MRA sector indeed took place after the MRA announcement.

5.3 Matching Early Retirees to Firms

Using Swiss Business Census and UN Comtrade data, we established that MRA sectors experience more competition, as measured by the drop in export prices, and more entry of firms than non-MRA sectors. Nevertheless, the exit of firms did not differ across MRA and non-MRA sectors.

We now return to our original dataset, described at section 4.1, to examine the correlation between early retirement behavior and firms' closure. Since the Swiss Labour Force Survey data lacks a firm identifier, we are unable to match individuals to specific firms or plants. To solve this problem, we use the information available on the firm in which an individual is employed to construct cells that could proxy for firms. In particular, we define a cell according to three attributes: the 4-digit NOGA industry code, the size class of the firm, and the canton of residence of the employee. With this

method, we obtain on average 5309 cells per year. Each cell will proxy for a single firm. We then construct a measure of cell closure, which we interpret as the firm closure. If the cell leaves the sample and does not return in the following years (until 2008), the cell (firm) is recorded as a firm closure in the year after its last appearance.

At tables 14 and 15, we analyze the differences respectively between MRA and non-MRA, and MRA and services, in the pre-treatment, announcement and implementation periods, in the occurrence of the following events: firm (cell) closure, closure of a firm (cell) in which there is at least one early retiree, existence of at least one early retiree in closing firm (cell) and existence of at least one early retiree in continuing firm (cell). Early retirement is defined as in the previous section. Panel (1) shows that there are no differences in the share of firms' (cells) closure in the two sectors in all three periods. The share of closing firms increases in all sectors after the implementation, but there is no statistical difference in the variation across treatment and control groups. Moreover, it is reassuring to notice that the share of closing firms (cells) is in line with the results obtained using the Swiss Federal Statistical Office (as reported in table 10). Panel (2) at tables 14 and 15 consider the exit rates among those firms that had at least one early retiree. Again, no difference between MRA and non-MRA or MRA and services emerges. Additionally, there are no variations across periods (before, announcement and implementation) either. Panel (3) at tables 14 and 15 analyze the early retirement behaviors among closing firms. Again, no statistical difference emerges across groups nor over time. The early retirement behavior among closing firms seems thus invariant to the MRA. Some interesting differences appear instead in Panel (4) at tables 14 and 15, where the early retirement behaviors among continuing firms is analyzed. The increase in the use of early retirement at announcement is statistically significant (and large) in the MRA sector but not in the non-MRA nor in the service sector. Early retirement instead increases in the continuing firms of all sectors after the implementation.

The results of this analysis that matches individual early retirement behavior and firm's behavior thus suggest that early retirement differs between MRA and non-MRA (or service) sectors only in those firms that remained in the market after the trade liberalization. The early retirement behavior of closing firms is instead similar across sectors. Taken together, the evidence presented in this section points to the crucial role of firm restructuring among continuing firms, rather then to firms' closure, in inducing early retirement behavior.

6 Concluding remarks

Retirement is a crucial aspect of all pension policies and its determinants have long been analyzed. Most of the existing literature focuses on the workers' choice, as if retirement were exclusively a labor supply phenomenon. Yet, decisions by the employers to retain

aging employees or to push them into retirement are also crucial. Steep seniority wages, high firing costs, rigid labor market regulations and even social concerns may prevent firms from displacing elderly – and perhaps less productive – workers. Early retirement may then become a handy solution.

However, despite some supporting evidence from survey data, the role of the firms in early retirement decisions is difficult to identify empirically. This paper exploits the negotiation and implementation of the Bilateral Agreements I between the EU and Switzerland, as a source of exogenous variation, which affects the labor demand of Swiss firms. As suggested by a vast literature, trade liberalizations may induce firms to relocate – both within and across sectors – and to innovate, with important labor market effects, particularly for the elderly workers.

We use a differences in differences approach to show that in firms affected by this MRA the use of early retirement provisions increased already in 1999, when the agreement was initially signed. The change in the age composition of the work force in the MRA sector featured also an increase in the employment of male workers in their thirties. The wage distribution by age was instead not affected. Using information from the Swiss Business Census and from the UN Comrade Database, we find that this increase in early retirement is not explained by more firms' exits in the MRA sector, nor by more early retirement among the firms exiting this sector. More early retirement in MRA can be attributed to a differential behavior among continuing firms, which seem to react to an increase in competition by adjusting their labor force.

These results have relevant policy implications. Recent reforms, which modified individuals' incentives by penalizing early retirement, have been rather successful in raising the employment rate among the elderly workers. However, the practice by large firms of inducing elderly, less productive workers to retire – for instance by providing attractive retirement packages – is still quite common. Reforms attempts to link retirement age to individuals' longevity will have to consider this additional hurdle.

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Tables and Figures

Figure 1: Value of Swiss Exports to the EU15 as a percentage of GDP
[12] Note: Own calculations using UN Comtrade data

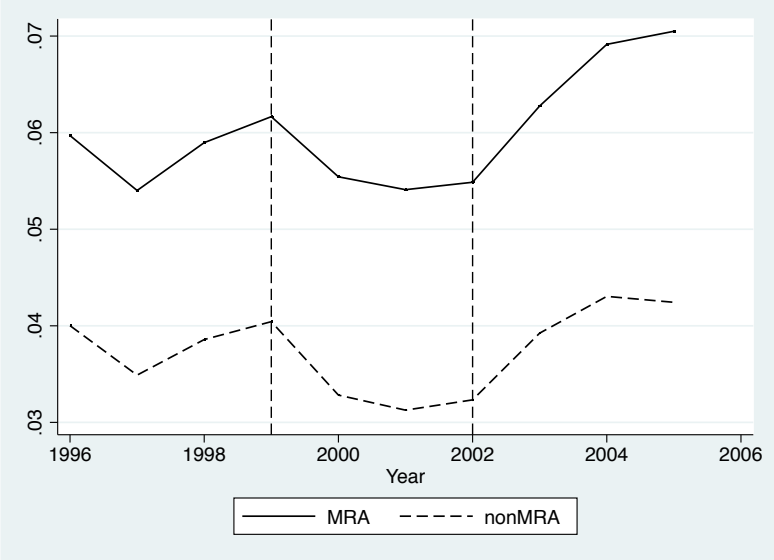

Figure 2: Value of Swiss Imports from the EU15 as a percentage of GDP
[13] Note: Own calculations using UN Comtrade data

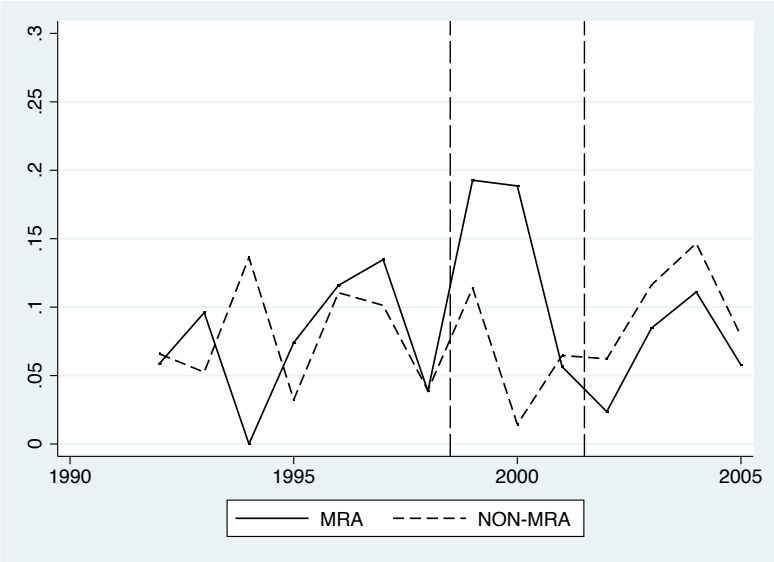

Figure 3: Share of Early Retirees

[14] Note: Own calculations using weighted data from the SLFS

Figure 4: Share of Early Retirees.

[15] Note: Own calculations using weighted data from the SLFS

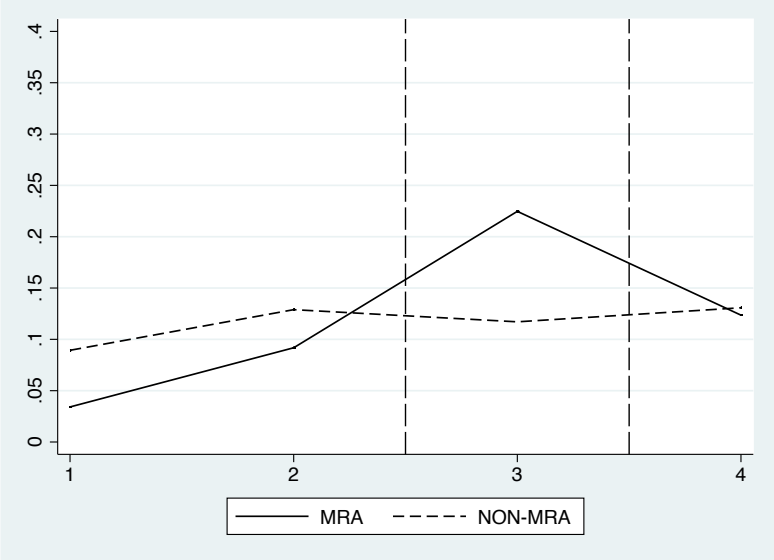

Figure 5: Share of Early Retirees

[16] Note: Own calculations using weighted data from the SLFS

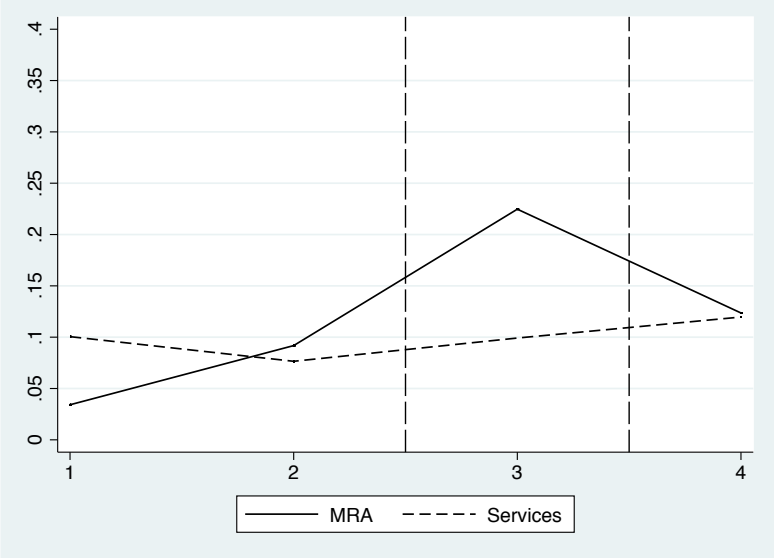

Figure 6: Share of Early Retirees

[17] Note: Own calculations using weighted data from the SLFS

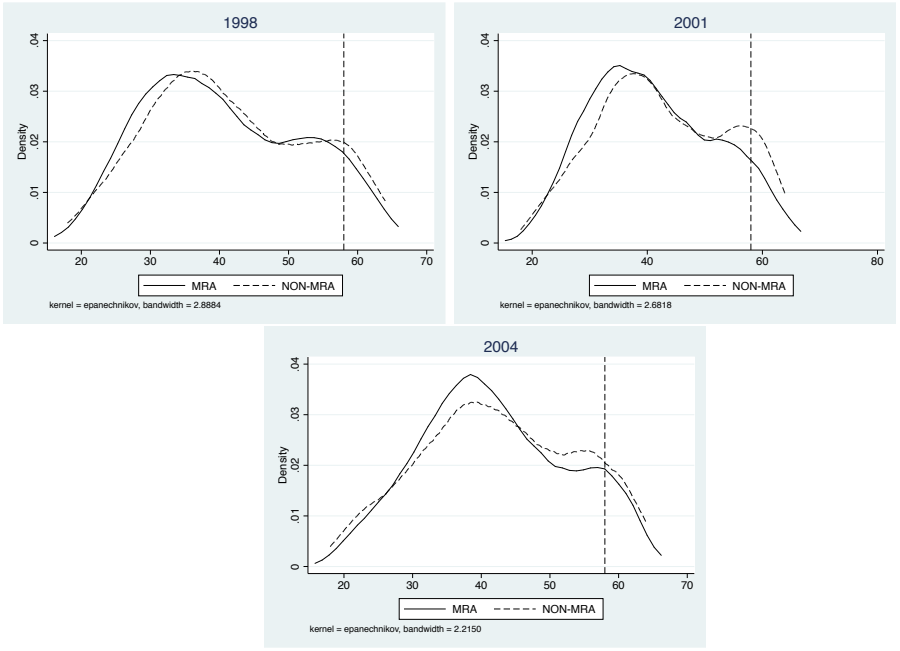

Figure 7: Workers Distribution by Age in MRA and non-MRA industries
[18] Note: Own calculations using data from the SLFS

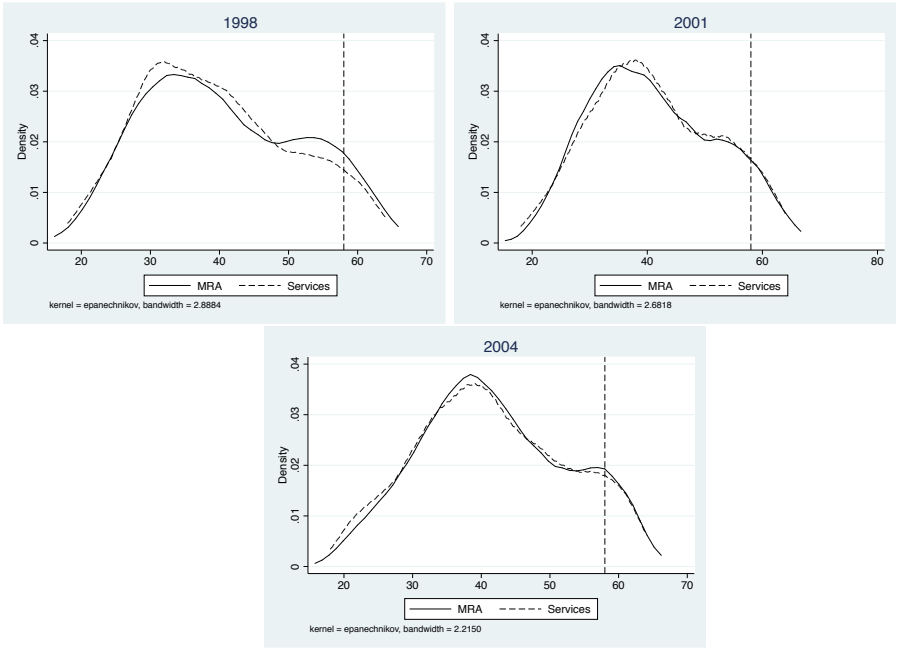

Figure 8: Workers Distribution by Age in MRA industries and in Services
[19] Note: Own calculations using data from the SLFS

Table 1: Descriptive statistics

Panel 1: Individual Data, Men 59-64						
Group	EarlyRet	Age	EduLevel	Married	Foreigner	Size
nonMRA	0.0891	61.3	2.04	0.775	0.255	3.36
sd	(0.285)	(1.68)	(0.654)	(0.418)	(0.436)	(1.66)
N	875	875	875	875	875	865
Services	0.114	61.2	2.19	0.784	0.174	2.75
sd	(0.317)	(1.62)	(0.645)	(0.411)	(0.38)	(1.69)
N	2677	2677	2677	2677	2677	2643
MRA	0.0917	61	2.24	0.798	0.268	4.06
sd	(0.289)	(1.64)	(0.656)	(0.402)	(0.443)	(1.44)
N	589	589	589	589	589	588
Total	0.105	61.2	2.16	0.784	0.205	3.07
sd	(0.307)	(1.64)	(0.652)	(0.411)	(0.404)	(1.71)
N	4141	4141	4141	4141	4141	4096

Panel 2: Individual Data, Men 18-64						
Group	logHWage	Age	EduLevel	Married	Foreigner	Size
nonMRA	3.45	42.1	2.06	0.662	0.33	3.39
sd	(0.399)	(11.3)	(0.623)	(0.473)	(0.47)	(1.62)
N	11911	13628	13628	13625	13628	13502
Services	3.51	40.6	2.21	0.609	0.282	2.93
sd	(0.492)	(11)	(0.626)	(0.488)	(0.45)	(1.67)
N	48664	55877	55877	55870	55877	55006
MRA	3.53	41.4	2.25	0.641	0.31	4.04
sd	(0.402)	(11)	(0.63)	(0.48)	(0.463)	(1.39)
N	10249	11631	11631	11630	11631	11546
Total	3.51	41	2.19	0.623	0.294	3.16
sd	(0.466)	(11.1)	(0.629)	(0.485)	(0.456)	(1.67)
N	70824	81136	81136	81125	81136	80054

Panel 3: Data at Industry Level, Men 18-64						
Group	logHWage	Age	Graduate	Married	Foreigner	Size
nonMRA	3.45	42.1	0.243	0.654	0.284	3.6
sd	(0.192)	(4.56)	(0.169)	(0.177)	(0.201)	(0.998)
N	239	240	240	240	240	240
Services	3.46	41	0.317	0.589	0.207	2.74
sd	(0.237)	(3.78)	(0.206)	(0.146)	(0.164)	(0.981)
N	360	360	360	360	360	360
MRA	3.49	41.2	0.325	0.636	0.231	3.96
sd	(0.157)	(3.6)	(0.166)	(0.14)	(0.165)	(0.614)
N	148	148	148	148	148	148
Total	3.46	41.4	0.295	0.619	0.237	3.26
sd	(0.209)	(4.04)	(0.19)	(0.158)	(0.18)	(1.06)
N	747	748	748	748	748	748

Note. Means of key variables in treatment and control groups: average log hourly net wage, share of early retirees, average age, average level of education ("1" primary or lower secondary; "2" upper secondary education ; "3" postsecondary and tertiary education), share of married individuals, share of foreigners, average size of enterprise ("1" if $n <= 10$; "2" if $n > 10$ and $n < 20$; "3" if $n >= 20$ and $n < 50$; "4" if $n >= 50$ and $n < 99$; "5" if $n > 99$). Sample of years 1992-2005. Standard deviations in parentheses.

Table 2: Baseline Covariates: Individual Data 1992-98, Men 59-64

Panel 1: MRA vs NON MRA			
	MRA	NON MRA	Difference
Age	60.07487	60.27304	-0.1981712
se	(0.1158667)	(0.0965871)	(0.1522706)
N	187	293	
Education level	2.224599	2.088737	0.1358617 **
se	(0.0469184)	(0.038633)	(0.0611848)
N	187	293	
Married	0.8235294	0.7849829	0.0385465
se	(0.0279524)	(0.0240423)	(0.0374759)
N	187	293	
Foreigners	0.1229947	0.1296928	-0.0066982
se	(0.0240817)	(0.0196609)	(0.0312379)
N	187	293	
Size	4.123656	3.238908	0.8847481 ***
se	(0.103717)	(0.0990438)	(0.1492826)
N	186	293	
Panel 2: MRA vs SERVICES			
	MRA	SERVICES	Difference
Age	60.07487	60.23256	-0.1576918
se	(0.1158667)	(0.0551082)	(0.1299466)
N	187	860	
Education level	2.224599	2.159302	0.0652966
se	(0.0469184)	(0.0214273)	(0.0508929)
N	187	860	
Married	0.8235294	0.7802326	0.0432969
se	(0.0279524)	(0.0141285)	(0.0329851)
N	187	860	
Foreigners	0.1229947	0.0976744	0.0253202
se	(0.0240817)	(0.0101292)	(0.0244515)
N	187	860	
Size	4.123656	3.020024	1.103632 ***
se	(0.103717)	(0.059194)	(0.1354784)
N	186	849	

Note. Pre-treatment baseline covariates in treatment and control groups and their difference. Sample of years 1992-1998. Standard errors in parentheses. The following symbols indicate different significance levels: *** - significant at 1 percent, ** - significant at 5 percent, * - significant at 10 percent.

Table 3: Descriptive analysis on probability of early retirement, Men 59-64

Panel 1: MRA vs NON MRA					
	Before	Announcement	After	Diff(Before-Ann.)	Diff(Before-After)
MRA	0.0641711	0.1584158	0.0863787	-0.0942447***	-0.0222076
se	(0.0179685)	(0.036513)	(0.0162191)	(0.036286)	(0.0249818)
NON MRA	0.0784983	0.0821918	0.0986239	-0.0036935	-0.0201256
se	(.0157393)	(0.022809)	(0.0142955)	(0.027502)	(0.0216934)
Diff	-0.0143272	0.0762241*	-0.0122451		
se	(0.0243775)	(0.0409096)	(0.021855)		
N	1464				
Panel 2: MRA vs SERVICES					
	Before	Announcement	After	Diff(Before-Ann.)	Diff(Before-After)
MRA	0.0641711	0.1584158	0.0863787	-0.0942447***	-0.0222076
se	(0.0179685)	(0.036513)	(0.0162191)	(0.036286)	(0.0249818)
SERVICES	0.105814	0.0989848	0.1222769	0.0068292	-0.0164629
se	(0.0104952)	(0.0150645)	(0.0086876)	(0.018558)	(0.0138368)
Diff	-0.0416428*	0.0594311 *	-0.0358981*		
se	(.0240189)	(0.0350195)	(0.0203101)		
N	3266				

Note. Sample of years 1992-2005. Standard errors in parentheses. The following symbols indicate different significance levels: *** - significant at 1 percent, ** - significant at 5 percent, * - significant at 10 percent.

Table 4: Pre-Treatment Trend, Early Retirement

	MRA vs non-MRA		MRA vs Services	
VARIABLES	Male	Male	Male	Male
Treatment	-0.002	-0.004	-0.019	-0.019
	(0.062)	(0.061)	(0.056)	(0.090)
Treatment*1993	0.052	0.057	0.043	0.046
	(0.085)	(0.084)	(0.077)	(0.079)
Treatment*1994	-0.107	-0.106	-0.090	-0.092
	(0.071)	(0.071)	(0.066)	(0.066)
Treatment*1995	-0.013	-0.009	-0.065	-0.067
	(0.076)	(0.076)	(0.082)	(0.083)
Treatment*1996	-0.004	0.000	-0.020	-0.025
	(0.103)	(0.103)	(0.098)	(0.100)
Treatment*1997	0.024	0.029	0.014	0.009
	(0.087)	(0.088)	(0.098)	(0.100)
Treatment*1998	-0.026	-0.022	-0.031	-0.036
	(0.075)	(0.076)	(0.070)	(0.073)
Observations	480	480	1,047	1,047
R-squared	0.016	0.018	0.011	0.024
1-digit NOGA FE	NO	YES	NO	YES

*** p<0.01, ** p<0.05, * p<0.1

Standard errors clustered at 4-digit industry level are in parentheses

Table 5: Probability of early retirement

	MRA vs non-MRA			MRA vs Services		
VARIABLES	Male	Male	Male	Male	Male	Male
Treatment	-0.014	-0.006	-0.017	-0.042*	-0.048**	0.016
	(0.027)	(0.027)	(0.030)	(0.023)	(0.023)	(0.039)
Ann	0.004	-0.004	-0.041	-0.007	0.001	-0.020
	(0.030)	(0.030)	(0.045)	(0.015)	(0.015)	(0.034)
After	0.020	0.023	0.016	0.016	0.033*	0.052
	(0.022)	(0.023)	(0.040)	(0.018)	(0.018)	(0.034)
Treatment*Ann	0.091*	0.084*	0.086*	0.101**	0.083*	0.080*
	(0.051)	(0.049)	(0.050)	(0.044)	(0.043)	(0.045)
Treatment*After	0.002	0.001	0.002	0.006	0.004	-0.008
	(0.030)	(0.030)	(0.032)	(0.028)	(0.027)	(0.028)
Observations	1,464	1,464	1,453	3,266	3,266	3,231
R-squared	0.006	0.045	0.057	0.003	0.049	0.076
Controls	NO	YES	YES	NO	YES	YES
age FE	YES	YES	YES	YES	YES	YES
size FE	NO	NO	YES	NO	NO	YES
year FE	NO	YES	YES	NO	YES	YES
region FE	NO	YES	YES	NO	YES	YES
1-digit NOGA FE	NO	NO	YES	NO	NO	YES

*** p<0.01, ** p<0.05, * p<0.1

Standard errors clustered at 4-digit industry level are in parentheses

Controls include dummies for marital, foreign, self-employment status and education level

Table 6: Log Hourly Wage by Age Group. Male workers. Individual data

	MRA vs non-MRA				MRA vs Services			
VARIABLES	18-29	30-39	40-49	50-64	18-29	30-39	40-49	50-64
Treatment	-1.299***	-0.230***	-0.266***	-0.190***	-1.116***	0.184***	-0.367***	1.019***
	(0.047)	(0.033)	(0.036)	(0.043)	(0.036)	(0.020)	(0.022)	(0.047)
Ann	0.115***	0.038	0.075	0.079	0.090***	0.043**	0.045	0.073
	(0.034)	(0.033)	(0.046)	(0.052)	(0.027)	(0.021)	(0.028)	(0.048)
After	0.124***	0.134***	0.088*	0.095**	0.097***	0.072***	0.093***	0.129***
	(0.024)	(0.025)	(0.045)	(0.047)	(0.023)	(0.020)	(0.025)	(0.042)
Treatment*Ann	-0.001	0.038	-0.008	0.011	0.016	0.010	0.007	0.049
	(0.037)	(0.025)	(0.031)	(0.057)	(0.026)	(0.019)	(0.028)	(0.053)
Treatment*After	-0.006	-0.024	0.020	0.052	0.023	-0.003	0.004	0.028
	(0.024)	(0.020)	(0.028)	(0.040)	(0.024)	(0.020)	(0.023)	(0.033)
Observations	3,267	7,091	5,803	3,122	10,155	19,382	15,375	6,827
R-squared	0.352	0.336	0.363	0.342	0.302	0.330	0.351	0.287
Controls	YES	YES	YES	YES	YES	YES	YES	YES
age FE	YES	YES	YES	YES	YES	YES	YES	YES
size FE	YES	YES	YES	YES	YES	YES	YES	YES
year FE	YES	YES	YES	YES	YES	YES	YES	YES
region FE	YES	YES	YES	YES	YES	YES	YES	YES
4-digit NOGA FE	YES	YES	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Standard errors clustered at 4-digit industry level are in parentheses

Controls include dummies for marital, foreign,self-employment status and education level.

Table 7: Share of Early Retirees

	MRA vs non-MRA		MRA vs Services	
VARIABLES	Males	Males	Males	Males
Treatment	-0.045		-0.039	
	(0.040)		(0.029)	
Ann	0.021	0.010	0.013	0.009
	(0.054)	(0.061)	(0.027)	(0.029)
After	0.045	0.099*	0.025	0.048
	(0.044)	(0.054)	(0.024)	(0.047)
Treatment*Ann	0.153*	0.165*	0.161**	0.167**
	(0.089)	(0.093)	(0.075)	(0.069)
Treatment*After	0.039	0.089	0.059	0.028
	(0.066)	(0.074)	(0.055)	(0.052)
Observations	232	232	357	357
R-squared	0.042	0.169	0.041	0.115
Controls	NO	YES	NO	YES
year FE	NO	YES	NO	YES
4-digit NOGA FE	NO	YES	NO	YES
Number of NOGA		66		99

Standard errors clustered at 4-digit industry level in parentheses
We control for share of foreigners, share of married individuals,
share of employment by firm size class,share of graduates,
share of individuals by macro-region of residence and average age

Table 8: Employment Share by Age Group. Male workers

	MRA vs non-MRA				MRA vs Services			
VARIABLES	18-29	30-39	40-49	50-64	18-29	30-39	40-49	50-64
Ann	-0.031	-0.019	0.077***	-0.027	-0.037***	-0.022	0.037**	0.023
	(0.024)	(0.025)	(0.028)	(0.026)	(0.012)	(0.016)	(0.015)	(0.016)
After	-0.028	-0.083***	0.097***	0.014	-0.064***	-0.014	0.035	0.043
	(0.028)	(0.031)	(0.031)	(0.029)	(0.018)	(0.025)	(0.027)	(0.026)
Treatment*Ann	-0.008	0.055*	-0.030	-0.016	-0.000	0.048**	-0.018	-0.030
	(0.026)	(0.029)	(0.031)	(0.031)	(0.019)	(0.024)	(0.022)	(0.023)
Treatment*After	-0.068***	0.133***	-0.013	-0.053	-0.031*	0.069**	-0.017	-0.021
	(0.019)	(0.035)	(0.024)	(0.033)	(0.018)	(0.029)	(0.024)	(0.024)
Observations	388	388	388	388	508	508	508	508
R-squared	0.120	0.114	0.122	0.080	0.200	0.044	0.133	0.127
Controls FE	YES	YES	YES	YES	YES	YES	YES	YES
period FE	YES	YES	YES	YES	YES	YES	YES	YES
4-digit NOGA FE	YES	YES	YES	YES	YES	YES	YES	YES
Number of NOGA	97	97	97	97	127	127	127	127

*** p<0.01, ** p<0.05, * p<0.1
Standard errors clustered at 4-digit industry level in parentheses
We control for share of foreigners, share of married individuals, share of employment by firm size class,
share of graduates and share of individuals by macro-region of residence

Table 9: Log Hourly Wage by Age Group. Male workers

	MRA vs non-MRA				MRA vs Services			
VARIABLES	18-29	30-39	40-49	50-64	18-29	30-39	40-49	50-64
Ann	0.107	0.017	0.015	0.185***	0.037	0.026	0.006	-0.043
	(0.074)	(0.040)	(0.047)	(0.064)	(0.038)	(0.024)	(0.028)	(0.032)
After	0.179**	0.108*	0.051	0.203**	0.001	0.135***	0.108*	0.073
	(0.073)	(0.057)	(0.052)	(0.082)	(0.064)	(0.039)	(0.056)	(0.055)
Treatment*Ann	-0.016	-0.004	0.017	-0.135*	0.015	0.007	0.023	0.055
	(0.073)	(0.049)	(0.058)	(0.070)	(0.053)	(0.033)	(0.047)	(0.059)
Treatment*After	-0.112*	-0.061	0.015	-0.050	-0.032	-0.002	0.021	-0.016
	(0.057)	(0.043)	(0.055)	(0.057)	(0.048)	(0.029)	(0.054)	(0.039)
Observations	317	366	360	358	463	490	483	480
R-squared	0.129	0.121	0.086	0.154	0.080	0.100	0.072	0.112
Controls FE	YES	YES	YES	YES	YES	YES	YES	YES
Period FE	YES	YES	YES	YES	YES	YES	YES	YES
4-digit NOGA FE	YES	YES	YES	YES	YES	YES	YES	YES
Number of NOGA	95	97	97	97	127	127	127	127

*** p<0.01, ** p<0.05, * p<0.1

Standard errors clustered at 4-digit industry level in parentheses

We control for share of foreigners, share of married individuals, share of employment by firm size class, share of graduates, share of individuals by macro-region of residence and average age

Table 10: Descriptive statistics, Business Census

Panel 1: Data at Industry Level			
Group	N Plants	Entry Rate	Exit Rate
nonMRA	149	0.241	0.255
sd	(525)	(0.17)	(0.181)
N	536	402	402
Services	889	0.34	0.297
sd	(1839)	(0.184)	(0.193)
N	964	723	723
MRA	94	0.266	0.251
sd	(173)	(0.142)	(0.157)
N	348	261	261
Total	525	0.297	0.277
sd	(1412)	(0.179)	(0.185)
N	1848	1386	1386

Note. Means of key variables in treatment and control groups: average number of plants, average employment level, average plant entry rate and average plant exit rate. Four waves of the Swiss Business Census (1995, 1998, 2001, 2005). Standard deviations in parentheses. Data at the 4 digit level of the NOGA 2008.

Table 11: Industry level Reallocation

	MRA vs non-MRA			MRA vs Services		
VARIABLES	log N Plants	Entry Rate	Exit Rate	log N Plants	Entry Rate	Exit Rate
Treatment*1998	0.019			-0.066		
	(0.046)			(0.053)		
Treatment*2001	0.062	0.024	-0.003	-0.118**	0.020	-0.024
	(0.051)	(0.023)	(0.033)	(0.057)	(0.020)	(0.031)
Treatment*2005	0.112**	0.001	-0.029	-0.133**	-0.001	-0.071**
	(0.055)	(0.022)	(0.033)	(0.061)	(0.018)	(0.029)
Observations	884	663	663	1,312	984	984
R-squared	0.047	0.026	0.032	0.056	0.027	0.026
year FE	YES	YES	YES	YES	YES	YES
4-digit NOGA FE	YES	YES	YES	YES	YES	YES
Number of NOGA	221	221	221	328	328	328

*** p<0.01, ** p<0.05, * p<0.1
Standard errors clustered at 4-digit industry level in parentheses

Table 12: Descriptive statistics, Comtrade

Panel 1: Data at Product Level						
	Exports			Imports		
Group	Quantity	ValueUS	UnitValue	Quantity	ValueUS	UnitValue
nonMRA	2214	9033	59.7	5638	13094	38.4
sd	(10563)	(39727)	(384)	(22025)	(44850)	(290)
N	15510	15510	15510	15510	15510	15510
MRA	1570	19580	74	3515	20780	43.7
sd	(6155)	(53748)	(265)	(13196)	(96265)	(179)
N	16010	16010	16010	16010	16010	16010
Total	1887	14390	67	4560	16998	41.1
sd	(8617)	(47662)	(329)	(18118)	(75574)	(241)
N	31520	31520	31520	31520	31520	31520

Note. Means of key variables in treatment and control groups: average quantity (net weights in kilograms, 1000 unit), average trade value (1000 US dollars), average unit value. The data are from the United Nations Comtrade database (1996-2005). Standard deviations in parentheses. Data at the 6-digit level of the Harmonized System (HS).

Table 13: Export and Import Prices

MRA vs nonMRA		
Log Unit Value		
VARIABLES	Exports	Imports
Treatment*97	-0.025	0.012
	(0.027)	(0.011)
Treatment*98	-0.031	0.012
	(0.028)	(0.013)
Treatment*99	-0.029	0.020
	(0.030)	(0.015)
Treatment*00	-0.043	-0.000
	(0.031)	(0.016)
Treatment*01	-0.060*	-0.005
	(0.031)	(0.016)
Treatment*02	-0.066**	-0.010
	(0.033)	(0.017)
Treatment*03	-0.072**	-0.003
	(0.034)	(0.016)
Treatment*04	-0.115***	-0.010
	(0.035)	(0.018)
Treatment*05	-0.089**	-0.014
	(0.035)	(0.019)
Observations	31,520	31,520
R-squared	0.035	0.132
6-digit HS FE	yes	yes
year FE	yes	yes
Number of HS	3,152	3,152

*** p<0.01, ** p<0.05, * p<0.1
Standard errors clustered
at 6-digit HS level in parentheses

Table 14: Firm Closure & Early Retirement

			Panel : Closure		
	Before	Ann	After	Diff(Before-Ann)	Diff(Before-After)
MRA	0.1805	0.1584	0.2665	0.02205	-0.08604***
se	(0.0063)	(0.0093)	(0.0071)	(0.01150)	(0.009558)
nonMRA	0.1798	0.1771	0.2594	0.002713	-0.07955***
se	(0.0054)	(0.0088)	(0.0064)	(0.01037)	(0.008368)
Diff	-0.0006809	0.01865	-0.007167		
se	(0.008351)	(0.01286)	(0.009561)		
N	8662	3426	8557		
			Panel 2: Closure among ER		
	Before	Ann	After	Diff(Before-Ann)	Diff(Before-After)
MRA	0.3333	0.2500	0.1538	0.08333	0.1795
se	0.1421	0.0112	0.0722	(0.1783)	(0.1431)
nonMRA	0.2609	0.2500	0.1429	0.01087	0.1180
se	0.0936	0.1305	0.0546	(0.1603)	(0.1011)
Diff	-0.07246	0	-0.01099		
se	(0.1652)	(0.1716)	(0.08970)		
N	35	28	68		
			Panel 3: ER among closing firms		
	Before	Ann	After	Diff(Before-Ann)	Diff(Before-After)
MRA	0.006006	0.01639	0.003891	-0.01039	0.002115
se	(0.0030)	(0.0081)	(0.0019)	(0.006985)	(0.003412)
nonMRA	0.006711	0.008982	0.004922	-0.002271	0.001789
se	(0.0027)	(0.0052)	(0.0020)	(0.005474)	(0.003310)
Diff	0.0007054	-0.007411	0.001031		
se	(0.004088)	(0.009222)	(0.002820)		
N	1560	578	2247		
			Panel 4: ER among continuing firms		
	Before	Ann	After	Diff(Before-Ann)	Diff(Before-After)
MRA	0.002646	0.009259	0.007777	-0.006614**	-0.005131**
se	(0.0009)	(0.0027)	(0.0016)	(0.002252)	(0.001867)
nonMRA	0.004169	0.005799	0.01034	-0.001630	-0.006173**
se	(0.0010)	(0.0020)	(0.0017)	(0.002022)	(0.001924)
Diff	0.001523	-0.003460	0.002565		
se	(0.001421)	(0.003220)	(0.002416)		
N	7102	2848	6310		

Note. Standard errors in parentheses. The following symbols indicate different significance levels: *** - significant at 1 percent, ** - significant at 5 percent, * - significant at 10 percent.

Table 15: Firm Closure & Early Retirement

			Panel : Closure		
	Before	Ann	After	Diff(Before-Ann)	Diff(Before-After)
MRA	0.1805	0.1584	0.2665	0.02205	-0.08604***
se	(0.0063)	(0.0093)	(0.0071)	(0.01150)	(0.009558)
Services	0.08446	0.08627	0.1887	-0.001810	-0.1043***
se	0.0021	0.0033	0.0030	(0.003930)	(0.003711)
Diff	-0.09603***	-0.07217***	-0.07778***		
se	(0.005454)	(0.008352)	(0.007179)		
N	20527	8727	20382		
			Panel 2: Closure among ER		
	Before	Ann	After	Diff(Before-Ann)	Diff(Before-After)
MRA	0.3333	0.2500	0.1538	0.08333	0.1795
se	0.1421	0.0112	0.0722	(0.1783)	(0.1431)
Services	0.05682	0.07692	0.1053	-0.02010	-0.04844
se	0.0248	0.0432	0.0235	(0.04707)	(0.03734)
Diff	-0.2765**	-0.1731	-0.04858		
se	(0.08446)	(0.09795)	(0.06655)		
N	100	55	197		
			Panel 3: ER among closing firms		
	Before	Ann	After	Diff(Before-Ann)	Diff(Before-After)
MRA	0.006006	0.01639	0.003891	-0.01039	0.002115
se	(0.0030)	(0.0081)	(0.0019)	(0.006985)	(0.003412)
Services	0.003516	0.004839	0.005771	-0.001323	-0.002255
se	0.0016	0.0028	0.0013	(0.003008)	(0.002272)
Diff	-0.002490	-0.01155	0.001880		
se	(0.003077)	(0.006771)	(0.002613)		
N	2088	864	4147		
			Panel 4: ER among continuing firms		
	Before	Ann	After	Diff(Before-Ann)	Diff(Before-After)
MRA	0.002646	0.009259	0.007777	-0.006614**	-0.005131**
se	(0.0009)	(0.0027)	(0.0016)	(0.002252)	(0.001867)
Services	0.005384	0.005482	0.01141	-0.00009759	-0.006028***
se	0.0006	0.0009	0.0009	(0.001081)	(0.001064)
Diff	0.002739*	-0.003777	0.003636		
se	(0.001394)	(0.002367)	(0.002136)		
N	18439	7863	16235		

Note. Standard errors in parentheses. The following symbols indicate different significance levels: *** - significant at 1 percent, ** - significant at 5 percent, * - significant at 10 percent.

Appendix

Table A.1: Pre-Treatment Trend, Log Hourly Wage by Age Group. Individual data

	MRA vs non-MRA				MRA vs Services			
VARIABLES	18-29	30-39	40-49	50-64	18-29	s30-39	40-49	50-64
Treatment	-0.100	-0.529***	0.234***	-0.255*	0.184***	0.257***	-0.265***	0.578***
	(0.069)	(0.057)	(0.083)	(0.130)	(0.036)	(0.048)	(0.029)	(0.101)
Treatment*93	0.037	-0.000	-0.081	0.074	0.070	0.035	-0.059	0.046
	(0.053)	(0.059)	(0.067)	(0.111)	(0.048)	(0.059)	(0.052)	(0.088)
Treatment*94	0.035	-0.050	-0.169**	0.298***	0.044	-0.005	-0.084	0.235**
	(0.065)	(0.069)	(0.067)	(0.101)	(0.053)	(0.062)	(0.055)	(0.103)
Treatment*95	0.058	-0.082	-0.136*	0.219**	0.046	-0.037	-0.032	0.127
	(0.063)	(0.061)	(0.074)	(0.110)	(0.047)	(0.054)	(0.055)	(0.101)
Treatment*96	0.089	-0.098*	-0.088	0.184	-0.001	-0.050	-0.043	0.130
	(0.122)	(0.057)	(0.079)	(0.130)	(0.091)	(0.049)	(0.051)	(0.105)
Treatment*97	0.085	-0.058	-0.141*	0.136	0.023	0.007	-0.065	0.079
	(0.088)	(0.059)	(0.084)	(0.136)	(0.063)	(0.048)	(0.059)	(0.099)
Treatment*98	0.187***	0.035	-0.096	0.144	0.131***	0.094	-0.048	0.077
	(0.064)	(0.087)	(0.097)	(0.138)	(0.042)	(0.071)	(0.059)	(0.110)
Observations	1,414	2,549	1,842	993	4,450	6,433	4,364	2,016
R-squared	0.145	0.182	0.245	0.274	0.129	0.188	0.215	0.215
4-digit NOGA FE	YES	YES	YES	YES	YES	YES	YES	YES

*** p<0.01, ** p<0.05, * p<0.1

Standard errors clustered at 4-digit industry level in parentheses

Table A.2: Pre-Treatment Trend, Share of Early Retirees

	MRA vs non-MRA	MRA vs Services
VARIABLES	Men	Men
Period	0.002	-0.017
	(0.058)	(0.032)
Treatment*Period	0.068	0.086
	(0.081)	(0.065)
Observations	111	173
R-squared	0.027	0.025
year FE	YES	YES
4-digit NOGA FE	YES	YES
N of NOGA	66	99

*** p<0.01, ** p<0.05, * p<0.1

Standard errors clustered at 4-digit industry level

Table A.3: Pre-Treatment Trend, Employment Share by Age Group

	MRA vs non-MRA				MRA vs Services			
VARIABLES	18-29	30-39	40-49	50+	29-	30-39	40-49	50+
Period	-0.009	0.009	-0.036	0.036	-0.023	0.016	0.017	-0.011
	(0.025)	(0.034)	(0.022)	(0.034)	(0.014)	(0.017)	(0.018)	(0.016)
Treatment*Period	-0.017	0.018	0.005	-0.006	-0.003	0.010	-0.048	0.041
	(0.039)	(0.046)	(0.037)	(0.049)	(0.034)	(0.034)	(0.035)	(0.039)
Obs	194	194	194	194	254	254	254	254
R-squared	0.009	0.005	0.037	0.019	0.024	0.013	0.016	0.011
period FE	YES	YES	YES	YES	YES	YES	YES	YES
4-digit NOGA FE	YES	YES	YES	YES	YES	YES	YES	YES
N of NOGA	97	97	97	97	127	127	127	127

*** p<0.01, ** p<0.05, * p<0.1
Standard errors clustered at 4-digit industry level in parentheses

Table A.4: Pre-Treatment Trend, Log Hourly Wage by Age Group

	MRA vs non-MRA				MRA vs Services			
VARIABLES	18-29	30-39	40-49	50-64	18-29	s30-39	40-49	50-64
Period	-0.148**	0.056	-0.016	-0.093	-0.010	0.012	-0.023	0.011
	(0.060)	(0.052)	(0.047)	(0.090)	(0.050)	(0.025)	(0.039)	(0.039)
Treatment*Period	0.189***	-0.002	-0.064	0.161	0.050	0.041	-0.058	0.057
	(0.071)	(0.061)	(0.067)	(0.104)	(0.063)	(0.039)	(0.061)	(0.064)
Observations	162	182	176	176	232	245	239	239
R-squared	0.119	0.029	0.031	0.026	0.004	0.019	0.021	0.012
Period FE	YES	YES	YES	YES	YES	YES	YES	YES
4-digit NOGA FE	YES	YES	YES	YES	YES	YES	YES	YES
N of NOGA	92	96	96	97	124	126	125	127

*** p<0.01, ** p<0.05, * p<0.1
Standard errors clustered at 4-digit industry level in parentheses

Table A.5: Products covered by the MRA

Machinery
Personal protective equipment
Toys
Medical devises
Gas appliances and boilers
Pressure Vessels
Telecomminications terminal equipment
Equipment and protective systems
Electrical equipment
Construction plants and equipment
Measuring instruments and prepackages
Motor vehicle
Good laboratory practice (GLP)
Medical products and GMP inspection and Bath Certification

Note. The table lists industrial products covered by the Mutual Recognition Agreement.