An agent-based approach to evaluate the impact of economic dismissals facilitation on the French labor market

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Abstract. The El Khomri law (also called "Work law") has triggered a lot of conflicting judgements among French economists. However no model has been used to evaluate its effects ex ante. We have developed over the past 10 years a model of the recent French labor market, in order to analyze in detail this market and do policy design and analysis. The model integrates the heterogeneity of agents, and their decisions (firms and workers) based on "search theory", which gives rational microeconomic foundations to behavior, albeit with decision rules using bounded rationality rather than optimal rules which cannot be computed in the complex system that the modeled labor market constitutes. We introduce many institutions and specially the two main labor contracts, Open-Ended contracts and Fixed Term Contracts. The WorkSim model simulates the gross flows between inactivity, unemployment and these two types of employment, with a consistent accounting system. It is calibrated by a powerful algorithm to set 63 parameters in order to fit 64 aggregate real variables. We analyze only the facilitation of the economic dismissals allowed by the El Khomri law but it is the most essential element of the law for the labor market. We find that it has little effect on global unemployment but benefits the young who crowd out the seniors. This result is based on the substitution by the employers of more precarious Open Ended Contracts to Fixed Duration Contracts which become useless, and the fact that young workers are more often in Fixed Duration Contracts than the other age categories. The labor market is deeply transformed. When aggregate demand is exogenously changed, the experiment shows that the employment and the unemployment react more strongly than before the law, yielding a higher aggregate flexibility.

1   Introduction

The El Khomri law project also called "Work" law has recently set the war not only on the French political scene, with many demonstrations and strikes, and a severe divide between the Left, it has also triggered a fight between prominent French economists who have taken very strong positions either for or against it [Aghion and al, 2016,Askenazy and al., 2016]. However the French labor market is a complex system, and any new law is likely to spurt reactions

by the agents, namely heterogeneous firms and heterogeneous workers and persons who might enter/quit the labor market, and the mobility flows, hires, fires and many other flows may generate opposed effects. The net consequences for employment, unemployment and participation may depend on the empirical strengths of these different effects. The categories of manpower are also likely impacted differently. Over the past years, we have developed a model of the French labor market as a complex system, with many interactions, in order to understand better how it functions, with the guiding idea that heterogeneity is key and institutions mediate the final effects. The objective is then to assess policy projects, an ex-ante analysis. Among achievements, the model has the ability to uncover particularly crowding out effects, a phenomenon difficult to evaluate ex-ante but a crucial one. We have described some of these complexities of the labor market policies for a previous reform called the "Generation Contract" in [Ballot et al., 2016], and shown that even if firms had hired on this contract up to the limit set by the program, the unemployment would have decreased by a very modest 30,000 due not only to the windfall effect which is widely mentioned, but also spells in the subsidized jobs much shorter than those computed without a model, and some crowding out that we measure. We are then puzzled by the flat statements on the El-Khomri law mentioned above. Some of the predictions are based on the Spanish and the Italian evolution of employment and unemployment after the labor market reforms in these countries, but the simple observation of an improvement in employment cannot be used to prove that the reform has had an impact. The state of the art in econometrics requires that there is a natural experiment, i.e. that the reform has been applied to only to a part of the workers in a country, and comparison is then made controlling for the heterogeneity between the treated and the untreated part. This is not the case, and it will be close to impossible to evaluate Matteo Renzi's Job Act as well as the present law ex-post, since the observed effect can be caused by an external demand shock or other causes. Although the previous criticism is sufficient, we will emphasize that there are plenty of institutional and other differences which matter. The facilitation of dismissals from Open Ended Contracts (OEC) in the El-Khomri law does not take the form of lower severance pay but of shorter delays before dismissals which can be legally implemented. Another essential point is the legislation on the temporary jobs, and specially the Fixed Term Contracts (FTC) which may appear as substitutes to the Open Ended Contracts, the first affected by an facilitation of the dismissals in the El-Khomri law. Although many countries have such jobs, the legislation is different between France and the mentioned countries.In fact our modeling the successive versions of the El-Khomri law has shown some differences in the results, and short run and long run effects may differ. Statements should then be backed by a full model of the labor market flows with the old and then the new law integrated in it, to get an under-

standing of the mechanisms by which the change in the law can have effects. We argue that the details of the legislation matter (see [Holmlund, 2014] along the same line of criticism). Econometric analysis of reforms, in order to side step the unavailability of natural experiments, has used cross-country analysis. The EPL index which first concerned only the Open Ended Contracts has been disaggregated to distinguish protection of the OECs and protection of the FTCs. Kahn [Kahn, 2010] who uses such two indexes shows that if "reducing restrictions on firing workers from permanents jobs appears to raise employment[..] these effects appear small and insignificant when control is done for country specific trends". These are precisely the macroeconomic trends and shocks that make so difficult a ceteris paribus assesment of national policies. We propose a modeling approach which has the fundamental advantage to be ex-ante, and can therefore analyze the effects of the change in the law based on its specificities. We use the latest WorkSim model version we have developed in [Ballot et al., 2015a] , calibrated by a powerful algorithm on 63 parameters and 64 targets to analyze the ex- ante effects of an essential element of the law El Khomri, namely the facilitation of the economic dismissals (article 30). The Law project contains a great number of other elements. Some have little relation with employment and unemployment. An important and hotly debated element, the so-called inversion of norms, opens the possibility to negotiate some changes at the firm level rather than at the sector level. It might affect the wages and the duration of work, but the extent that the inversion will take is completely unknown, and cannot be modeled presently. These simultaneous changes, and specially those concerning the duration of work may modify some of the net effects of the Law that we obtain. However the facilitation of economic dismissals can be expected to be the most important change for the labor market, and our simulations confirm that the effects should be considerable. Moreover an essential purpose of the paper is to propose a method to do ex ante analysis of a labor law in a detailed labor market with heterogeneous interacting agents, a method that has not been used so far. The paper presents the results corresponding to the final version of the law, voted on July 21, 2016. The important limit of the study is that we do not have a macroeconomic model at this stage, so that we explore the direct effects that a change in the institutions of the labor market may have on the employment and unemployment, leaving aside induced changes in aggregate demand and investment which in turn modify employment again. One way to look at this is to assume that they are second order effects, but this may not be true. Our view is rather that it is legitimate to do the intellectual experiment of isolating the direct specific role of lowering the so-called "labor market rigidities", since the international institutions repeatedly point to their responsibility in the high French unemployment rate, either at the global level, or at the level of some specific categories (young, low skilled...). If the direct effects are not

important, this emphasis may be misplaced. If they are, further development of our model into a macroeconomic model becomes a research agenda.

The Agent-Based methodology is used. It offers a method to take into account the numerous decisions and institutions mentioned, and to simulate complex systems on a computer (see [Stiglitz and Gallegati, 2011] for a plea of their use, and [Ballot et al., 2015b] for an assessment of the state of the art). Agents are represented individually and they are heterogeneous. They have market but also non-market interactions (for instance inside a household). Agents are autonomous and there is then no need for an auctioneer to close transactions, an unrealistic fiction. The decentralization of the labor market matters for its outcomes. The agents take decisions based on their information and the calculation of costs and benefits, and the profit (for the firms) or utility (for the individuals) they expect. The environment is very complex because of the institutions and the interactions, and changing. Then their rationality is bounded in the sense of [Simon, 1956]. Therefore, when in a given state, they choose the best of a few possible alternatives (see below for examples). The values of these alternatives cannot include computations on a infinite horizon, as is done in optimization models, but they do some intertemporal calculus. They cannot have rational expectations and do mistakes but they learn that the outcome is bad, in WorkSim, they take another decision in the new period. The institutions and legal rules that constrain the decisions are modeled precisely. Summation is done only on individual outcomes in order to compute the aggregated statistics, and this can be done for different categories of a same type of agents (young, blue-collars . . .). These statistics can be as detailed as the scale of the model allows, and in turn this scale is determined by computation constraints. The models then allow for non-linear relations between aggregate variables, and notably crowding-out effects. The computed effects of the present law will bring a resounding example. These models can be calibrated with a varying degree of sophistication, and when the purpose is to study a policy, as in this paper, it is an essential part of the research. The development of macroeconomic Agent-Based models with labor market has a thin but long history, dating back from Barbara Bergmann and Gunnar Eliasson micro to macro models [Bergmann, 1974,Eliasson, 1977], while [Ballot, 1981,Ballot, 2002] built ARTEMIS, a detailed model of the French labor market, and a forerunner for the present model. Barlet et al. (2009) have also proposed a smaller but calibrated model of the French labor market to study the effect of the rise of the minimum wage and the decrease of social charges.

2 Overview of the model WorkSim

In this paper, we extend WorkSim, a detailed model of the French labor market, which reproduces the gross flows of individuals between the main states, employment, unemployment and inactivity Employment is subdivided into the fixed term contracts (FTC) and open-ended contracts (OEC). Due to lack of space, the presentation will not include the equations which can be found in [Goudet et al., 2016]. The flows are generated by the interactions of the rational decisions of numerous heterogeneous agents (around 20 000 in our simulations), representing multi-job firms and individuals, who belong to households. The individuals take into account the incomes of the other members of their household when they decide. They also age and the demographic events of the households are reproduced, based on current statistics, but aiming for a steady state. Individuals retire and die, and are replaced by young individuals who become agents when they are 15 years old. The flows generate a consistent system of flows accounts, so that all the costs and benefits induced by each flow unit are accounted for, a necessary tool for precise market and policy analysis. The core theoretical framework for the decisions is costly search of jobs by the individuals and of workers by the firms, the so called "search theory" and the most used and flexible intellectual framework in economics for studying labor markets as flows of creation and destruction of jobs and as mobility flow systems as well (see [Mortensen and Pissarides, 1994]). The individuals base their decisions on comparisons of utility between the different states they can reach or try to reach. For instance an employed individual may choose between searching for a new job, either searching on-the-job or quitting to be a full time unemployed searcher, quitting for inactivity, or just staying a non-searching employee in the same firm. The firms compute the expected profits from decisions about opening vacant jobs or not, firing or not, etc. It should be stressed that the methodology of modeling individual heterogeneous decisions in the search process gives much more precise microeconomic foundations to matching in a decentralized labor market than the aggregate matching function widely used nowadays, which assumes homogeneity of the agents. Our decision methodology also implies modeling anticipations, a crucial element in the model which will be exposed below. Finally we obtain a complete stock-flow system which is summarized in the Figure 1.

The institutions constrain the decisions: among the important institutions are the minimum wage, the welfare system, and the main features of Labor Law. For instance, for the purpose of the study of a change in firing rules, crucial institutions are the computation of the firing costs, the measure of the constraint behind the rule "serious economic problems" to trigger economic dismissals without undergoing the risk of litigation, and the grace period before opening again a terminated FTC. It is possible to modify an institution
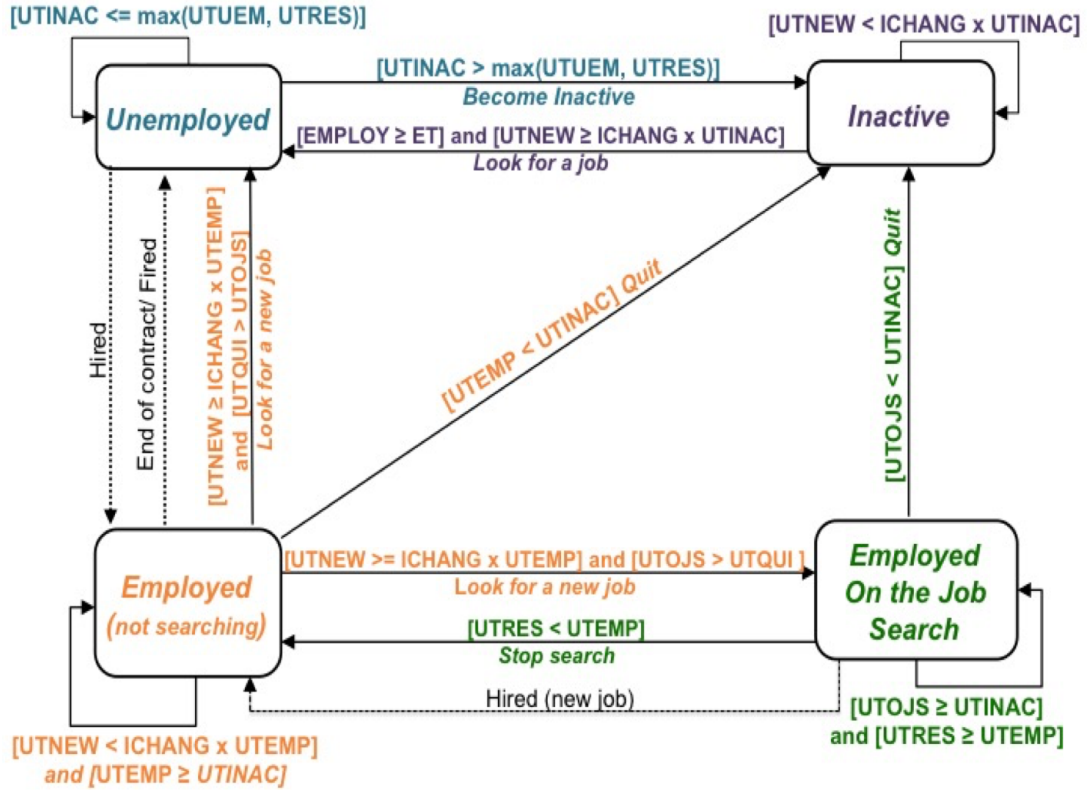
Fig. 1: Diagram of the main flows in WorkSim

and study the effects on the variables of interest at the aggregate level of the market or at the level of the different categories of workers. The model is then a powerful exploratory tool for labor market policy. The demand for the (representative) good is exogenous and stable since we look for a steady state as a benchmark to study the impact of the change in the law. However the market share of each firm follows a random walk (combined with a random trend changing each year), which can be interpreted as representing the stochastic changes of tastes of consumers for the variety of the good that a given firm produces. The decision of a firm on the opening of a new job, when present demand exceeds production capacity, is based on a computation of the expected discounted future profit on such a job, taking into account the expected revenue from the sales, and costs, namely the (learned) cost per period of the vacancy over the expected vacancy duration, the expected costs of labor (wages, social security..), the amortization of training costs if any, and the termination costs. These are general benefits and costs for any type of job. However the

model goes beyond to endogenize the choice between an OEC and a FTC, and in the latter case, endogenizes the specified duration of the FTC. We have undertaken a thorough treatment of this choice, and it the basis to the main contribution that we can bring to the analysis of the El Khomri law project. The firms make anticipations on own future demand. More precisely each firm makes three scenarios of its demand evolution within a range that is given by the history of its demand (trend and variance): upper and lower values for a standard error, and the trend scenario. We compute the complete costs and revenue at the horizon of the contract,for each type of contract, taking into account for an OEC the option of dismissal under some conditions and costs, and for a FTC contract, considering a set of of discrete durations, including one possible renewal (of same duration). Then, the firm weights each scenario and we adopt here [Tversky and Kahneman, 1979] prospect theory, with possible asymmetries for the pessimistic, the neutral and the optimistic scenario (the weights are be calibrated simultaneously with the other unknown parameters). The firm then chooses the contract which gives the highest expected profit. If this expected profit is negative the job is not created. (see figure

This framework sets the stage to a multidimensional arbitrage between opening a FTC and an OEC when present demand is higher than capacity. For the first time in the (tiny) literature on the endogeneization of the choice between these contract types, we consider that it is not a question of substitution based on one motive only, but that there are two types of substitutions, and also two types of complementarities, so that the methodology we use (agent based model plus calibration) appears as a powerful tool to evaluate the mix of the two contracts, and the effects that policy can have on that mix. The first substitution factor is the termination cost, the factor which has focused most of the analysis in the literature although we include here essential but neglected elements. The OECs have a cost of termination which is the severance pay. We add an estimate of the hoarding costs which start from the day demand declines until the day the employer fires, considering that he has run into a "serious economic problem", that the current law requires. However the employee may sue and the definition of what a serious economic problem is fuzzy and in a each case in the hands of the industrial judges. The employer then includes expected litigation costs. For FTCs, we consider costs specific to them, such as the grace period which delays a new hire when the contract is terminated. The second important substitution factor is the amortization of the costs of training newly hired workers , which can be far too costly to hire on a short FTC[5]. We have highlighted also two complementarity factors. The first one is the screening that FTCs allow before hiring on an OEC, which diminishes the number of dismissals (personal as well as economic). The second

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[5] another interpretation of this type of cost is the lower than standard productivity when learning the job
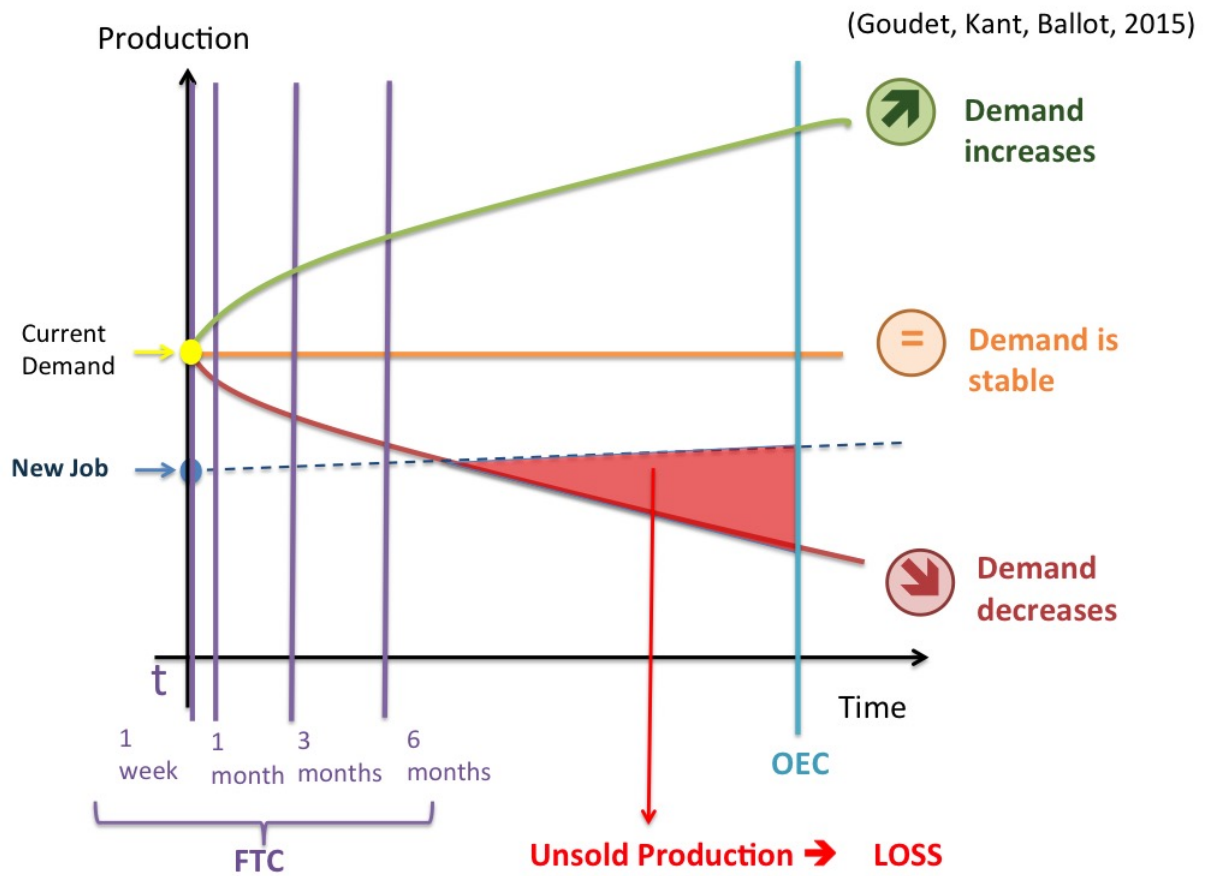
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Fig. 2: Demand anctipation mechanism

is the buffer that FTCs constitute when the firm faces the uncertain future demand we mentioned. If the employer has a sufficient number of FTCs, he can still decide to hire an OEC since he calculates that the FTCs will come to an end and he does not have to fire the OEC if demand falls. The cost of dismissal is avoided and the benefit from a better amortization of the training costs is gained. The computation of all the terms of the arbitrage determines the net benefits of each type of contract and the duration if the FTCs of all durations are more profitable than an OEC. The distribution of durations of FTCs is then endogenous, its variance is high, and the (very) short durations the majority (the median duration of a FTC is 3.5 weeks). These are prominent stylized facts in the French labor market, and a social issue.

Some firms may go bankrupt and are replaced with an entrepreneur who starts alone. The model is at a scale of 1 to 2300 and has the week as the base period, in order to reproduce the gross flows, rather than transition rates be-

tween distant dates, which would miss most of the very short spells in FTCs (as is the case for studies based on the Labor Force Survey), and most mobilities[6].

The model is calibrated by the CMA-ES algorithm CMA-ES (Covariance Matrix Adaptation Evolution Strategy) designed by [Hansen and Ostermeier, 2001]. The principle of this evolutionary algorithm is to test step-by-step new generations of points in the parameters space. Each new generation of points is drawn stochastically according to the results obtained with the previous generation of points. The mean and the covariance matrix of the distribution of the new randomly drawn points are updated incrementally in order to move towards the best results obtained by previous generations. The fitness function is minimized at the horizon of 400 periods in a steady state. Presently the steady state reproduces 64 observed variables for the year 2014 as weighted targets in the fitness function and we obtain a median standard error of 8.5%. There are 63 parameters calibrated and the others are taken from the law or demographic statistics.

The model generates some important specific characteristics of the French Labor Market in 2014. We give here the simulated figures. The results display the very important share of FTCs in terms of flows, 80% of the total (FTC plus OEC), and the contrasting fairly low figure of the share of the workers employed in such contracts: 8% [7]. The unemployment of the young is also much higher than the unemployment of the older workers, at 25% against 9.3% for the 25-49 and 6.35% for the 50-65[8]. This dualism in the French Labor Market, is confirmed by the differences in the patterns of gross flows of the categories of workers (see Goudet et al ...). The model computes all the simulated flows, but allows for comparison with those which can be measured by the published statistics, and the results fit roughly. Most workers are stable in their OECs, while a minority undergoes short spells of employment in FTCs and spells of unemployment between them. Moreover this dualism persists for part of the young workers when they age while the others obtain more stable OEC. Another important result is the values of the calibrated weights in the anticipations. The weight give by the employers to the pessimistic scenario (a standard error below the trend) is 90%, meaning that French employers have a very high loss aversion. Other novel results are obtained but will not be detailed here, since they are not the core of this paper.

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[6] a day might seem better, however the ILO definition of unemployment which is used in the calibration does not distinguish unemployed during a day and during a week. A worker who has been employed during an hour during a week is not categorised as unemployed

[7] the real figures are: 84% for the share of FTC in the flows, and 10% for the share in employment. Source : [Sanzeri, 2014])

[8] the real figures are respectively 23.4%,9.3%,6.7%

3 Dismissals facilitation in the El-Khomri law

First we simulate the facilitation of the economic dismissals, for a steady state of the exogenous aggregate demand, and secondly we study the differential effect on unemployment before the El-Khomri law and after the law when aggregate demand changes exogenously. Before the new law, the economic dismissals are allowed if the firm faces "serious economic problems". In our understanding of case law which has taken generally a strict interpretation, we interpret these problems as able to lead to the failure of the firm, and since we have to put a figure, as losses over a period of one year, which corresponds to the computation of the accounts of small firms. Judges may have their own interpretation over the minimum level of losses which could lead to failure. The minimum level is then not our arbitrary decision but calibrated simultaneously with the other parameters of the model, and found as 28% of sales revenue in the reference simulation. The judge intervenes only if the fired workers sue, which happens in 1% of cases of economic dismissals. However the workers win in 64% of the litigations. The version adopted by the Council of Ministers on March 24, 2016 (Art. L. 1233-3-2) offered two different sets of conditions according to the presence of an agreement on the dismissals obtained by collective bargaining at the firm level, or the absence of such an agreement. We name the first ECO1 and the second ECO2. In the first case, dismissals are possible if a firm has a decline in demand during two successive quarters or losses during a quarter, in the second case, the requirement is a decline in demand during four successive quarters or a loss during a semester. The final version of the El-Khomri law voted on July 21 (article 30) conditions firing to a decline either in its demand or its turnover computed over a certain period, which rises in the firm size. For firms under 11 employees, the period is 1 quarter, for those between 11 and less than 50 the period is 2 quarters, for firms between 50 and less than 300, the delay is 3 quarters, and for firms with 300 employees or more the delay is 4 quarters.The government motives for such a differentiation are likely to be that large firms have a stronger financial position and are able to resist profit declines or losses, and also that a mild decline can be enough to fire some workers so that a high delay should prevent dismissals for short run motivations. On the other hand, around 45% of firms have between 1 and 10 employees (45% have no employee), and they are less likely to fire even one worker in case of such a mild decline, but they have a weaker financial position that would threatens their survival if the delay for firing was long, as it was the case before the law. We name this set of conditions ECO4. Two remarks are in order. First the writing of the article 30 is ambiguous and allows for an interpretation in which the demand in each quarter should be compared to the corresponding quarter in the preceding year, a more demanding condition. We have simulated this version (called ECO 3), which yields less flexibility, but

will not report it here to avoid an inflation of figures, and since it is less likely to be the favored interpretation. Second other alternative motives for firing such as technological mutation are written in the two successive law projects. The conditions are not precise, and moreover, they already existed before the El-Khomri law. Their permanence means that they should have no differential impact, and we can leave them aside.

3.1 Effects under a stable aggregate demand

We will focus our analysis on the law as it has been finally voted. ECO4 yields effects which change over time after the introduction of the law. They evolve during the first 3 years to stabilize generally after 4 years. The first can be termed short run effects and the latter long run effects. This comes from the fact that it takes time for the firing conditions to be filled under the new law, even if they are weaker than previously. Hiring requires only that the firm faces a rise in demand and that the job is expected to be profitable. The short term effects should then be favorable, but under stable aggregate demand, individual declines are just as many as the increases in the long run and the conditions to fire get satisfied. This does not mean that long run results should be null, but they should be less favorable than short term effects. Permanent jobs are more profitable because of the decrease of firing costs (including hoarding costs), and, when deciding over firing or not, firms take into account not only the legal condition, but also the comparative cost benefits of firing versus keeping the employee. Lower firing costs means that it is less costly to keep an employee during a downturn than firing and rehiring another who has to be trained. We will first consider figures for all the population.

After 1 year the difference in global unemployment with the reference simulation is non significant, and is remains so after 4 years (the decline is 23,030). Employment does not rise after one year, and rises only by 90,750 after 4 years (significant only at 10%) [9].The increase in employment is higher than the decrease in unemployment since the latter stimulates entry of non participants into the labor market, a well documented labor market behavior that the model is able to reproduce [Chauvin and Plane, 2001]. However ECO 4 is very favorable to the young (15-24), both in the short and the long run, with a decline in unemployment of 222,000 after 1 year and of 148,610 after 4 years. This means a huge decrease of the unemployment rate by 7.5 points in the first year and remains 5.6 points under the simulation reference after 4 years (starting from a simulated 25%). The increase in employment is 247,000 after

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[9] we give the difference with the reference simulation at the same date and not the changes within the El-Khomri simulation over time. This a choice in the present version. The two options do not yield exactly the same figures, since the reference simulation undergoes some mild fluctuations, even though we average over 200 runs

4 years. If we turn to the central age class (25-49), unemployment and employment do not show any significant change. Finally the seniors (50-65) undergo a substantial rise in unemployment compared to the situation before the law, 145,000 after 1 year, and 101,430 after 4 years, from 6.35% to 9.2%, i.e. more than 2 points, and an decrease in employment (-121,160). In their case, the longer run, specially after 8 years improves their situation which becomes only very slightly worse than before the law in terms of unemployment, but the loss in employment remains substantial. There is clearly a discouragement effect.

This is only part of the story. The mobility on the labor market is found to change very deeply, and the nature of the labor market is transformed. The share of FTCs in the hires falls from 80% to 30% after 4 years. The share of OECs in hires is the complement and then rises from 20% to 80%. The OECs becomes the dominant hiring contract. The proportion of FTCs in ongoing contracts falls from 8.0% to 2.33%, while the remaining contracts are shorter than before the law (renewal not included) with a mean of 1.9 weeks against 3.7 weeks, meaning that the FTCs are now used only when future demand forecasts are bad and no training is required[10]. The economic dismissal rate jumps from 0.5% to 19% after 4 years, a major change in a French labor market characterised by a very low economic dismissal rate, since it has steadily decreased over the years, probably because the conventional separations are an easier way to make an employee leave. These "conventional separations" (*ruptures conventionnelles*) of OECs, which are a bargained separation between the employer and an employee, are not modeled as such here but included in the personal dismissals. A caveat should then be included. These conventional separations can be expected to rise as a consequence of the law in order to avoid litigation and should smooth somewhat the explosion of economic dismissals. Yet this would not change the fact that, after 4 years, the mean duration of OECs is 3 years, half the duration before the law, as a consequence of the rise of economic dismissals. Two major conclusions can be drawn. First a significant substitution of the young to the seniors takes place, although it declines with time. Second the new load of adjustment set on the OECs has the logical effect of making the FTCs an almost useless tool of flexibility for the employers except when they have a demand anticipation which is so bad that they favor jobs with very short durations. The explanation of the opposed effects concerning the young versus the other categories is clear. The young were much more often than the others in FTCs (22% against 7.5% for the 25-50 and 4.7% for the seniors) and benefit from their fall. The effect then goes much beyond the higher flexibility of OECs. The El-Komri law raises the integration of the young into OECs. This shows that the two complementarity factors between OECs and FTCs, screening (plus experience gains) and buffer, are much smaller

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[10] the contracts which can be renewed undefinitly in certain sectors so called "contrats d'usage "in French, are in the model but left aside the computation

than the substitution effects in the case of the El-Khomri law. We certainly overestimate the substitution, since we assume that all the jobs (except the "contrats d'usage") can be held with any of the two contracts. There are jobs that require a high duration to build trust and can be held only under an OEC. Inversely only FTC contracts can be signed to replace absent workers[11]. This puts some ceiling on the substitution. We do not have figures and have avoided arbitrary limits. However we maintain that this mechanism, the net substitution of OECs to FTCs, and its effect, the substitution of young workers to seniors, will be important. It has been overlooked or greatly underestimated by non quantitative analysis of the law. The second major conclusion is that the flexibility which existed through FTCs takes another form. The proportion of workers who have been unemployed at least once in the year rises by 2 points, with a percentage which goes up to 20%. But if one looks at the OECs, the change is stronger. They become much shorter on average, hence more precarious. The probability for an employee in an OEC to loose a job rises from 8.17% to 13.13, almost 5 points.A last adverse consequence of the shorter duration of jobs is that the 3 types of human capital (general, specific to an occupation, specific to a job) decrease substantially on average.

3.2   Sensitivity of adjustment to aggregate demand

We now change exogenously aggregate demand in order to compare the effects on the unemployment rate of the firing conditions before the law and after the law. Figure 3 gives values after 4 years. The adjustment of the employment is predicted to be more sensitive to aggregate demand after the law. When demand rises by 10%, unemployment decreases by 2.97 points, instead of 1.95 points in the simulation without the law. If demand declines under its value in the reference simulation by 10%, then unemployment increases by 4.64 points instead 3.09 points. First when demand rises above the reference value, the employers hire more easily on OECs, and unemployment decreases more under the law. Second, if demand decreases under its value in the reference simulation, economic dismissals are more important, the suppression of the hoarded labor is more complete, and unemployment rises more under the law El-Khomri. The responses become very asymmmetric for large (and unrealistic) changes. If demand becomes very high, there always remains some search unemployment by workers who take the time to find a job which satisfies their reservation utility. However if demand becomes very low, the ajustment of the labor force by the employers is more complete under the El-Khomri law and the unemployment becomes much higher than in the reference simulation. This experiment on

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[11] The limits that the law sets on hiring on FTCs in France, i.e. only one renewal in 2014, a maximum duration of 18 months, and the grace period before hiring again an FTC on the same job, are all taken into account in the model, but the El-Khomri law has not changed these constraints.

changing exogenous demand highlights the increased macroeconomic flexibility which was a purpose of the law, concerning economic dismissal conditions. It shows that if demand increases exogenously, the unemployment declines more than without the law, but the model does not show that it declines just because the law is implemented, for a given aggregate demand.
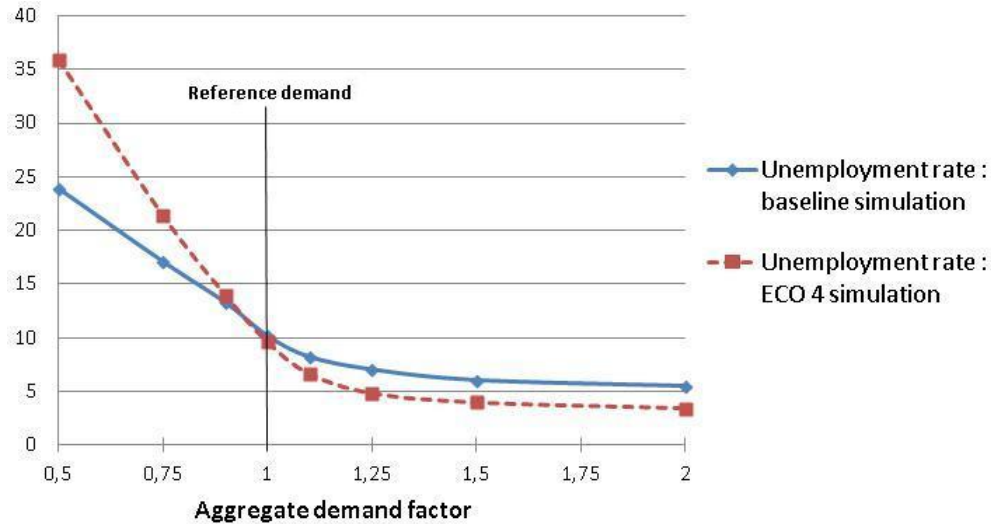

Fig. 3: Sensitivity to demand shocks. x-axis displays the demand factor $df \in [0,5;2]$, where the total demand D_{tot} becomes $df \times D_{tot}^{ref}$

4 Conclusions

The experiments with WorkSim bring food for thought since they are not what the proponents expected, when writing the law. First hopes to raise total employment by facilitating the economic dismissals are not confirmed, since hires and fires rise simultaneously and empirically, happen to cancel. Our results are the first available for the French case (at least for the El-Khomri law), but they are not contradictory with the available literature on EPL reforms, theoretical and empirical. The theoretical literature based on optimal firms decisions in response to firing costs reforms dates back to [Bentolila and Bertola, 1990]. It takes into account that employers forecast, when hiring on OECs, that firing will be costly: lower firing costs increase fires and hires but the impact on the average level of employment and unemployment is theoretically ambiguous. However it did not take into account the two-tier structure of the labor market. The literature has then evolved to include the existence of FTCs. Then the protection can change for one of the two types of contracts, or the two.

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What matters most is the gap in the protection rights. In our case the protection for FTCs does not change, but the demand of FTCs can be expected to be different. No study on the French case has been done for former reforms, for lack of a non treated group, but some cross country studies can be found including France. We already mentioned that [Kahn, 2010] finds no effect on employment if national trends are taken into account. [Drager and Marx, 2012] do not study reforms but show on a cross-country data set that the more rigid the protection of OEcs is, the more the firms use temporary workers to face workload fluctuations, a conclusion that the change in the French law illustrates. [Centeno and Novo, 2012] for Portugal find that a increase of the EPL for OECs yields an increase in the labor share of the FTCs. Second, several effects that have not been studied precisely in the literature before appear with force in our study: two opposed effects on precariousness appear, that show the complexity of a labor market policy: the FTCs fall abruptly, a decrease in precariousness, and the mean duration of an OEC is greatly lowered, a rise in precariousness. Both effects are intuitive but our study of the change in the law suggests massive effects, even though our results overestimate the technical possibilities of substitution between the contracts. A better integration of the young in OECs is achieved, although the effect decreases in the long run. Moreover the young substitute (or crowd out) the seniors since as shown, the total effect is neutral. Finally the changes in exogenous demand show that the EL-Khomri law appears as a favorable condition to decrease unemployment if demand rises, not a sufficient condition. Moreover the adjustment is higher also in case of demand decrease. However more work, which on our agenda, is needed to make our model more reliable. First, even if modeling only the article 30, some effects of the reform on aggregate demand may alter the results. On average firms see their profits rise by 16% as a result of the faster suppression of hoarded labor and of lower wages. The mean wage decreases by 9% since the lenghts of spells in OECs decreases (and productivity is lower). Lower wages have a negative effect on demand. Higher profits have effects which depend on their utilisation. They may mean more investments and/or a decrease in prices that improves competitiveness and foreign and internal demand. Then opposed effects on demand occur, but the net effect has no reason to be null. We intend to build a simple agent-based model of the goods and financial markets to embed WorkSim. Second we build an extension of the model with temporary help jobs, which could allow the a more precise assessment of the substitutions between the 3 contracts.Third we intend to study the lifetime effects of the El-Khomri law on cohorts of workers entering the labor market under the law versus cohorts entering and do their carrier without the law, the artificial counterpart to natural experiments. Other elements of the law may alter its effects. The employers may be tempted to increase the duration of work since the supplementary hours are less costly, and this lowers the employment in

the firm which puts this increase into practice. However macroeconomic effects of the duration of work through the salaries, the profits, and the change in competitiveness are complex, and require the macroeoconomic framework we mentioned above. We have also left aside for future work another element in the law, the "guarantee for the young", aimed at providing them a welfare subsidy and a strengthened help for finding a job. More precisions would be needed to model such a help, since crowding out effects, that our model can easily study, are possible. Therefore we will avoid the flat judgment that many economists have on this complex law, beyond the important consequences that our experiments have uncovered.

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