

Preliminary work - Extensive and intensive margin in
employment recovery following a financial crisis

Françoise Delmez

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1 Introduction

Bad news regarding employment have received large media coverage ever since the recent recession episodes of 2008 and 2012 and employment has seemed to be lagging even when gross domestic product and other indicators (such as investments) displayed signs of a recovery. The phenomenon of an economy recovering for every aspect albeit employment has been dubbed “jobless recovery” in the literature since it was first observed in the early 2000’s. For clarity of my purpose, a schematic jobless recovery is pictured in the figure 1 below; and for what follows, the timing of the cycle always references to GDP per capita: peaks and troughs refer to the GDP such that the “recovery” refers to the period after the trough of GDP.

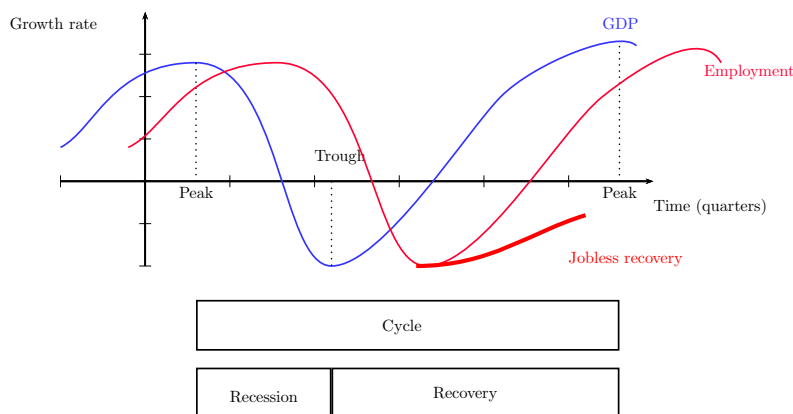


Figure 1: A schematic jobless recovery

Many previous studies have already focused on reasons why employment recovery would be lagging behind more than “usual”, that is to say beyond the lag generated by pure adjustment frictions. Among them, hoarding, demographic changes (Stock & Watson (2012)) and lack of confidence in the sustainability of the recovery (Schreft *et al.*(2005), Schmitt-Grohé & Uribe (2012)). This paper feeds a specific branch of the jobless literature that links them to the presence of financial frictions. Different mechanisms linking financial frictions and employment have already been explored, such as the financial accelerator (Bernanke (2009), Bernal-Verdugo *et al.* (2013)), the direct dependance of employment on credit through the cost of opening a vacancy or the need for working capital (Boustanifar (2014), Pagano & Pica (2012), Dromel *et al.* (2010), Wasmer & Weil (2004)), the amplification of labour market variations by agency costs on credit markets (Petrosky-Nadeau (2014)) and the absence of collateral on employment (Calvo *et al.*(2012)). This paper uses a large database (Ohanian & Raffo (2012)) of 15

countries and 50 years to confirm that the employment rate recovers more slowly after a financial crisis.

Beyond the presence of jobless recoveries, this paper explores a new mechanism possibly at play: by decomposing total hours worked into the employment rate and hours worked per worker, it can be demonstrated that joblessness only concerns the employment rate. Moreover, hours worked per worker have been recovering more strongly during jobless recoveries. First, this finding reconciliates the jobless literature and evidences put forward by Gali, Smets & Wouters (2012) who find no joblessness in the recent recessions. Second, this finding adds to the branch of literature on joblessness that argues that an increase in productivity during the recession led to jobless recoveries. Among papers in this branch, Jaimovich & Siu (2012), Burger & Schwartz (2014) and Srivastava & Theodore (2005) explore the role of sectoral shifts during recessions, following the idea of Shupeterian productive destruction. Productivity-enhancing restructuring at the firm level are explored by Petrosky-Nadeau (2013) and Berger (2012).

The mechanism explored in this paper echoes most closely the lasting increase in effort in Lazear *et al.* (2013). More generally, our work draws attention to the fact that breaking down the total employment into the employment rate and the hours worked per worker leads to different conclusions. In fact, no jobless recovery can be found when looking at total hours worked, we do find a jobless recovery when looking separately at the employment rate and at average hours worked per worker. To our knowledge, only a few previous studies have looked at the intensive margin of employment (including Fang & Rogerson) but none has looked in detail at the impact of financial crises on both margins of employment.

2 Database and Method

2.1 Database

The evidences presented in this paper are based on an empirical analysis on 15 countries¹ and more than 50 years (1960 to 2014) leading to a total of 2462 observations (the dataset is mainly restricted by the availability of hours dat series) constituting 140 distinct cycles. Among those, 63 cycles display a recession (GDP per capita decreases from peak to trough), 77 cycles display a mere contraction (GDP per capital grows at a slower rate) and 29 cycles display a financial crisis. Summary statistics on cycles are given in tables 1 and 2 where the recession's length counts the number of quarters from peak to trough and the recession's depth measures the growth rate of GDP from peak to trough.

The dataset used is novel in one main dimension: the quarterly hours worked per worker series from the Ohanian and Raffo database. The rest of the data are standard country time series extracted from the OECD database, Bassanini & Duval database

¹Australia, Austria, Canada, Finland, France, Germany, Ireland, Italy, Japan, Korea, Norway, Spain, Sweden, The United Kingdom and The USA

	Average	Median	Min	Max
Recession length	8.5	8	2	19
Recession depth	1,13%	0,9%	-13%	20%
Employment rate	67%		59%	75%

Table 1: Descriptive statistics over cycles

	1960's	1970's	1980's	1990's	2000-2005	2006-2010
Average recession depth	6%	1%	0.9%	0.6%	2,3%	-3%

Table 2: Descriptive statistics over time

on labour market institutions as well as labour market characteristics data from the ICTWSS that ranks countries each year on scale from 1 (no wage coordination) to 5 (fully centralized wage-setting). Very diverse levels of employment protection are present in the database as can be seen in table 3.

Employment protection	level 1	level 2	level 3	level 4	level 5
Share of all observations	17%	12%	22%	30%	20%

Table 3: Distribution of employment protection levels

The hours worked series are composed of the number of hours worked by individual worker as reported in surveys and harmonized over time and countries. It also takes into account the number of days that are not worked. The level of hours worked individually varies over time with a decreasing trend but it especially varies a lot across countries, from around 1500 annual hours in Norway and Sweden to above 2200 in Ireland, Japan and Korea.

The identification of financial crises is a central in our research. This research relies on the identification made by Reinhart and Rogoff (2009) who identify 29 financial crises in our 15 countries as:

“Bank runs that lead to the closure, merging, or takeover by the public sector of one or more financial institutions; and if there are no runs, the closure, merging, takeover or large-scale government assistance of an important financial institution (or group of institutions), that mark the start of a string of similar outcomes for other financial institutions.” (Reinhart & Rogoff (2009))

In robustness analyses, we will use the alternative definition and identification by Laeven and Valencia (2012), which will yield the same results. As expected following many previous studies, the average output fall (measured as the sum of quarterly growth rate of GDP per capita from peak to trough) is much higher in financial crises (-4,6%) than in non financial crises (-2,56%). The length of crises (number of quarters from peak to

trough) is surprisingly not very different in financial crises and non-financial crises (6,15 versus 6,33 quarters). Also, financial recessions display significantly larger decline in the employment rate (in coherence with Calvo *et al*'s results regarding the unemployment rate)² but the presence of a financial crisis during the recession makes no strong difference for hours worked. More precisely, hours worked per worker are globally not strongly affected during recessions, even though this apparent absence of variation is an average and could hide large differences between jobs or sectors, with some workers reducing their paid hours and other working unpaid overtime for example.

Regarding the recovery period, Figure 2 shows the different patterns (with and without financial crisis) of both the employment rate and the number of hours worked per worker over the years following a trough (in $t = 0$, all cumulative growth rate are thus equal to zero). It clearly appears that in the presence of a financial crisis, the employment rate is recovering more weakly and the opposite is true for hours worked per worker. The objective of the paper is to measure and evaluate the significativity level of the pictured differences.

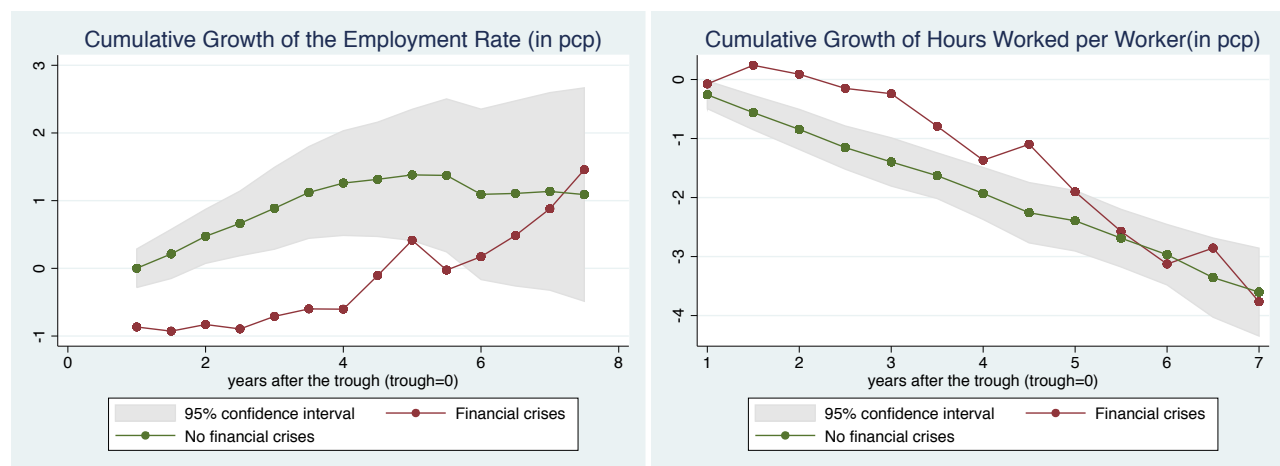


Figure 2: Average cumulative employment rate and hours worked growth following the trough

2.2 Empirical strategy

The following section intends to test the impact of a financial crisis on employment in a sample of 15 developed countries over the last 50 years. In particular, we want to estimate

²Calvo *et al*, as other studies often look at the unemployment rate. We prefer employment to unemployment measures because it carries more information than the unemployment rate, especially in the cases where discouraged job-seekers drop from unemployment statistics or when students differ their entry on the labour market waiting for more favourable conditions.

on one hand the impact of a financial crisis on the growth rate of the employment rate and on the other hand the impact of a financial crisis on the number of hours worked per worker, with a focus on the aftermath of recessions.

In practice, we compute the growth rate of both the employment rate and hours worked over 1 to 16 quarters, leading to have 16 different regressions for both dependent variables: explaining the growth rate of employment over one quarter, over two quarters, over three quarters, and so on until sixteen quarters. More precisely, for any quarter t , we look back one to sixteen quarters (i) backwards and measure the growth rate (over the period $t - i$) of both the employment rate and hours worked per worker. The explaining variables are the same in all the regressions, that only differ in the time-horizon considered when computing growth rates.

The main variable in which we are interested is the dummy variable accounting for the presence of a financial crisis during the cycle from which the observation comes. This financial crisis variable refers to the definition made by Reinhart and Rogoff and is equal to one if at least one quarter during the cycle is reported as a financial crisis episode.

Because we intend to look at whether a financial crisis has an impact on its own, we also want to control for factors that can impact employment and hours (in particular if they would potentially correlate with the presence of financial crises). There are two categories of such factors: the economic business cycle, represented by the GDP, and institutional factors determining the relative importance of the extensive and the intensive margin in labour. First, we will always control for the growth rate of real GDP per capita computed over the same time-horizon than the dependant variable. For example, when explaining the growth rate of employment over four quarters, we control for the growth of GDP over the same 4 quarters as well. In addition to this, we then use the lag the measured growth rate of GDP by two quarters to avoid reverse causality issue and ease the interpretation of results.

The second category of factors to be controlled for is institutions. Different strategies are used together: direct control for variables measuring the type of institutions in place and countries fixed effects, exploiting the panel dimension of our dataset. The country fixed effect should be enough but the direct estimation of the impact of some labour institutions, in particular the level at which wages are being bargained (taking values from 1 to 5, 5 being a very centralized process) yields interesting results.

Finally, we want to take care of historical coincidence effects. In fact, it could be that financial crises happen more often during some periods (in particular, some other work reveal the impact of financial liberalization in the 1980's on the frequency of financial crises) and that at the same time the labour force becomes relatively more intensive than extensive. The latter change in the labour force could be due a series of reason from changes in preferences of household to changes in labour market regulation or changes in the type of jobs performed (services typically requiring more flexibility than manufac-

turing). To avoid the interference of such historical coincidence on our estimates of the impact financial crises have on employment and hours, we introduce dummies indicating the decade of the observations: 1960's is the reference period and the other periods are the 1970's, the 1980's, the 1990's, the 2000-2005 period and the 2006 to 2010 period. Results are presented in the following section.

The estimated model is the following:

Employment rate (Hours worked) growth between t and $t-i$ =

$$\begin{aligned}
& (\text{level of the employment rate (hours worked) } i \text{ quarters ago})_{t-i} \\
& + (\text{presence of a financial crisis during the recession})_t \quad (A) \\
& + (\text{dummy on being } i \text{ quarters after trough})_t \quad (B) \\
& + (A) * (B) \\
& + (\text{GDP growth over the last } i \text{ quarters})_{t-2} \\
& + (\text{level of wage coordination})_t \\
& + \text{dummies: 1960, 1970, 1980, 1990, 2000, 2006} \\
& + \text{constant} \\
& + u_i(\text{country-specific error term}) + e_{it}
\end{aligned}$$

3 Results

3.1 Employment

Table 4 shows the results for employment growth rate over different time horizon (i) after the trough. Each column refers to the employment rate growth over a different (increasing) number of quarters. For example, the first column refers to the quarterly growth of the employment rate, the second column explains the growth of the employment rate cumulated over two quarters, the third column over three quarters etc.

First of all, results clearly show a significant negative impact of a financial crisis during the cycle on the employment growth even after the growth of GDP, country fixed effects and the level of employment rate³ are accounted for. This effect of financial crises is however not modified during recoveries.

Also expected and re-assuring, the employment positively correlates to the growth of GDP (variable "GDP growth L2" which measure the growth rate of GDP over the

³As expected, the higher the employment already is, the lower the growth rate, this being partly due to the way growth is computed, a two percentage point increase in employment represent less growth in percentage if the employment rate is higher. It also related to the intuition that the closer a country is to full employment, the less it can still increase its employment rate.

same time horizon lagged two periods to avoid reverse causality issues). So the slower the recovery of GDP, the lower the recovery of employment. The length of the preceding recession or contraction episode is not found to be relevant.

Variables measuring the labour market institutions also play an important role, especially the level at which wages are bargained. The more centralized the bargaining (high values of “level”), the higher the employment growth. The strength of the coordination mechanism only plays a role for the growth of the employment rate computed over very short periods.

Variables “trough_1” to “trough_16” are dummy variables indicating whether or not the observations is x many quarters after a trough. Those dummies will allow to capture unmeasured factors specific to recovery periods that can also impact the employment recovery. There does indeed seem to exist unobserved factors that positively impact employment rate growth in the four years following the trough and the results are not presented in the table, the variable is mainly kept as a control to allow for the correct interpretation of the interaction term.

Finally, after controlling for all the above, there also seem to be factors that have increased employment growth over time compared to the 1960’s, as all time-period dummies capture significant effects.

VARIABLES	Employment rate growth over i quarters											
	(1) 1 quarter	(2) 2 quarters	(3) 3 quarters	(4) 4 quarters	(5) 5 quarters	(6) 6 quarters	(7) 7 quarters	(8) 8 quarters	(9) 9 quarters	(10) 10 quarters	(11) 11 quarters	(12) 12 quarters
Financial crisis	-0.0465 (0.0394)	-0.0633 (0.0631)	-0.0659 (0.0821)	-0.108 (0.103)	-0.187 (0.121)	-0.263* (0.140)	-0.313** (0.157)	-0.402** (0.173)	-0.437** (0.187)	-0.452** (0.199)	-0.492** (0.211)	-0.471** (0.222)
gdp growth L2	0.0784*** (0.0115)	0.208*** (0.0129)	0.306*** (0.0123)	0.347*** (0.0123)	0.376*** (0.0124)	0.400*** (0.0127)	0.413*** (0.0131)	0.416*** (0.0135)	0.418*** (0.0137)	0.414*** (0.0139)	0.401*** (0.0141)	0.389*** (0.0140)
trough#fin_crisis	-0.123 (0.101)	-0.127 (0.161)	-0.107 (0.209)	-0.0315 (0.263)	0.156 (0.323)	0.314 (0.384)	0.455 (0.474)	0.681 (0.543)	0.895 (0.616)	0.894 (0.767)	1.270 (0.933)	0.802 (1.128)
coord	0.0482*** (0.0159)	0.0881*** (0.0255)	0.116*** (0.0331)	0.142*** (0.0414)	0.172*** (0.0490)	0.190*** (0.0565)	0.223*** (0.0635)	0.254*** (0.0704)	0.264*** (0.0762)	0.291*** (0.0820)	0.302*** (0.0877)	0.321*** (0.0927)
average recovery	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
decade trend	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
base empl rate level	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1,393	1,383	1,372	1,364	1,357	1,350	1,343	1,336	1,327	1,318	1,310	1,301
R-squared	0.097	0.214	0.349	0.410	0.456	0.486	0.505	0.516	0.531	0.539	0.542	0.547
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
restrict to recoveries	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Explaining the cumulative growth of the employment rate after the trough

3.2 Hours worked

Regarding hours worked (results in table 5), a significantly positive impact of a financial crisis is found on the growth of hours worked computed starting at 4 quarters of cumulated growth. This effect is reinforced in the quarters following a trough. This supports the view that the intensive margin is used a substitutes to re-hiring during

recoveries following financial crises. As for the employment rate, the higher the number of hours worked already is, the lower the growth rate of hours worked, probably both for computational and human capacity reasons. The GDP growth positively correlates to hours worked as expected, the same lag strategy is used to avoid reverse causality issues in the interpretation of the results. The length of the preceding recession or contraction is again not relevant.

The level at which wages are bargained is significant, as it was for employment but with the opposite sign: the more centralized the bargaining (higher values of “level”), the lower the growth of hours worked per worker. The “level” variable does seem to play an important role, pushing into a extensive recovery of employment instead of a recovery trough the intensive margin. This plays against the effects of financial crises, suggesting that countries where wages are more centralized suffer less from jobless recoveries induced by financial crises. The strength of coordination is again not relevant.

VARIABLES	Hours worked growth over i quarters											
	(1) 1 quarter	(2) 2 quarters	(3) 3 quarters	(4) 4 quarters	(5) 5 quarters	(6) 6 quarters	(7) 7 quarters	(8) 8 quarters	(9) 9 quarters	(10) 10 quarters	(11) 11 quarters	(12) 12 quarters
Financial crisis	0.0154 (0.0905)	0.0478 (0.0864)	0.109 (0.0924)	0.217** (0.106)	0.202* (0.106)	0.221* (0.115)	0.282** (0.120)	0.276** (0.128)	0.330** (0.129)	0.348*** (0.134)	0.297** (0.139)	0.322** (0.139)
gdp growth L2	0.0116 (0.0264)	-0.0103 (0.0176)	0.0235* (0.0138)	0.0383*** (0.0126)	0.0402*** (0.0108)	0.0407*** (0.0103)	0.0408*** (0.00993)	0.0376*** (0.00972)	0.0402*** (0.00915)	0.0400*** (0.00907)	0.0376*** (0.00892)	0.0369*** (0.00847)
trough#fin_crisis	-0.0247 (0.232)	-0.119 (0.220)	0.123 (0.235)	-0.126 (0.271)	0.467* (0.283)	0.735** (0.315)	0.740** (0.363)	0.655 (0.399)	-0.0696 (0.423)	0.270 (0.517)	-0.164 (0.613)	-0.164 (0.708)
coord	-0.0348 (0.0363)	-0.0511 (0.0347)	-0.0852** (0.0370)	-0.0931** (0.0424)	-0.107** (0.0426)	-0.121*** (0.0459)	-0.148*** (0.0483)	-0.172*** (0.0513)	-0.183*** (0.0518)	-0.192*** (0.0546)	-0.183*** (0.0569)	-0.207*** (0.0575)
Observations	1.393	1.383	1.372	1.364	1.357	1.350	1.343	1.336	1.327	1.318	1.310	1.301
R-squared	0.021	0.037	0.057	0.071	0.097	0.118	0.129	0.146	0.174	0.192	0.199	0.220
average recovery	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
decade trend	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
base hour level	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
restrict to recoveries	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Explaining the cumulative growth of hours worked per worker after the trough

3.3 Additional results - further work

A series of robustness and sub-sample analysis have been already been conducted following the preliminary results described above and the conclusions can be amended by the following observations. First, estimating the model over different sub-period samples yield different conclusion: before 1990, a financial crisis has a significantly positive impact both on hours worked and on the employment rate. The results presented above are thus only valid for observations after 1990. This should be investigated further but it can already be said that the above results are not driven solely by the latest recession episodes, dropping observations after 2005 do not change the conclusions. It could potentially be driven by the low frequency of financial crises before 1990.

Employment rate recovery												
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	1 quarter	2 quarters	3 quarters	4 quarters	5 quarters	6 quarters	7 quarters	8 quarters	9 quarters	10 quarters	11 quarters	12 quarters
Fin crisis	-0.143*** (0.0513)	-0.222*** (0.0775)	-0.340*** (0.0947)	-0.477*** (0.111)	-0.615*** (0.132)	-0.693*** (0.150)	-0.746*** (0.162)	-0.917*** (0.175)	-0.969*** (0.189)	-1.075*** (0.200)	-1.082*** (0.208)	-1.069*** (0.215)
gdp L2	0.104*** (0.0198)	0.272*** (0.0191)	0.368*** (0.0167)	0.428*** (0.0160)	0.479*** (0.0168)	0.523*** (0.0176)	0.546*** (0.0180)	0.554*** (0.0187)	0.561*** (0.0194)	0.555*** (0.0200)	0.555*** (0.0204)	0.541*** (0.0203)
trough#fin_crisis	-0.0842 (0.126)	0.0248 (0.190)	0.162 (0.233)	0.213 (0.275)	0.363 (0.341)	0.370 (0.396)	-0.00858 (0.489)	0.257 (0.583)	0.280 (0.676)	1.078 (0.809)	1.694* (1.023)	0.888 (1.165)
coord	0.0475 (0.0461)	0.0764 (0.0692)	0.0978 (0.0841)	0.112 (0.0979)	0.149 (0.116)	0.162 (0.131)	0.149 (0.143)	0.196 (0.155)	0.275* (0.167)	0.390** (0.178)	0.424** (0.185)	0.424** (0.191)
Observations	808	807	806	805	804	802	801	800	798	796	794	793
R-squared	0.121	0.271	0.442	0.548	0.597	0.641	0.677	0.694	0.708	0.716	0.729	0.736
decade trend	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
base empl rate level	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
restrict to recoveries	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Explaining the cumulative growth of the employment rate after the trough, after 1990

Hours worked in the recovery												
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	1 quarter	2 quarters	3 quarters	4 quarters	5 quarters	6 quarters	7 quarters	8 quarters	9 quarters	10 quarters	11 quarters	12 quarters
Fin crisis	-0.0103 (0.119)	0.0387 (0.109)	0.113 (0.118)	0.254* (0.139)	0.247* (0.134)	0.236 (0.147)	0.303** (0.147)	0.354** (0.155)	0.371** (0.160)	0.441*** (0.162)	0.400** (0.166)	0.428*** (0.161)
gdp L2	0.127*** (0.0448)	0.0320 (0.0263)	0.0666*** (0.0201)	0.0821*** (0.0189)	0.0740*** (0.0158)	0.0645*** (0.0155)	0.0641*** (0.0142)	0.0601*** (0.0139)	0.0618*** (0.0134)	0.0677*** (0.0128)	0.0635*** (0.0126)	0.0579*** (0.0115)
trough#fin_crisis	-0.115 (0.291)	-0.320 (0.266)	-0.0556 (0.291)	-0.509 (0.344)	0.353 (0.343)	0.686* (0.383)	1.061** (0.430)	0.422 (0.481)	-0.222 (0.519)	-0.164 (0.586)	-0.912 (0.725)	-0.435 (0.773)
coord	0.0673 (0.112)	0.00352 (0.103)	-0.124 (0.112)	-0.0904 (0.130)	-0.142 (0.126)	-0.180 (0.137)	-0.287** (0.138)	-0.332** (0.146)	-0.305** (0.150)	-0.312** (0.153)	-0.221 (0.157)	-0.347** (0.154)
Observations	642	642	642	642	642	642	642	642	641	640	639	638
R-squared	0.102	0.122	0.184	0.218	0.247	0.271	0.289	0.309	0.317	0.341	0.328	0.332
decade trend	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
base hour level	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
restrict to recoveries	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Explaining the cumulative growth of hours worked per worker after the trough, after 1990

Second, the model was previously estimated using not a panel but a method similar to the Local Projection Method developed by Jordà (2005). This other method led to same conclusions regarding the impact of a financial crisis on both the extensive and the intensive margins of labour. In addition, this previous method did not allow to exploit the panel dimension of the dataset, as each observation corresponded to one recovery (from the trough of a cycle to the next peak) in one country and different countries do not have simultaneous cycles nor the same number of cycles over time. This previous method however was controlling for country fixed effects through dummies identifying countries, which allowed to identify countries behaving significantly differently from a reference country. This has revealed that the US and more globally anglo-saxon countries typically were experiencing recoveries that were on average more extensive than intensive, compared to European and Asian countries.

Employment rate recovery										
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	1 quarter	2 quarters	3 quarters	4 quarters	5 quarters	6 quarters	7 quarters	8 quarters	9 quarters	10 quarters
fin crisis	-0.194*	-0.313*	-0.456**	-0.455*	-0.435	-0.312	-0.328	-0.103	0.754	0.427
	(0.117)	(0.174)	(0.219)	(0.268)	(0.345)	(0.373)	(0.479)	(0.636)	(0.626)	(0.847)
gdp L2	0.132***	0.167***	0.234***	0.229***	0.270***	0.343***	0.441***	0.385***	0.399***	0.319***
	(0.0353)	(0.0418)	(0.0500)	(0.0551)	(0.0600)	(0.0600)	(0.0770)	(0.0926)	(0.0873)	(0.0955)
coord	0.0922*	0.173**	0.217**	0.323**	0.328**	0.551***	0.430**	0.464	0.312	0.671
	(0.0549)	(0.0789)	(0.103)	(0.130)	(0.151)	(0.181)	(0.216)	(0.291)	(0.285)	(0.407)
Observations	164	163	159	150	142	133	115	92	82	70
R-squared	0.166	0.184	0.231	0.216	0.227	0.318	0.341	0.272	0.330	0.351
decade trend	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
base empl rate level	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
restrict to recoveries	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Explaining the cumulative growth of the employment rate after the trough using one observation per cycle

Hours worked in the recovery										
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	1 quarter	2 quarters	3 quarters	4 quarters	5 quarters	6 quarters	7 quarters	8 quarters	9 quarters	10 quarters
fin crisis	-0.110	-0.245	0.103	0.0426	0.398	0.636	0.802*	0.195	0.0133	-0.112
	(0.239)	(0.267)	(0.298)	(0.281)	(0.337)	(0.382)	(0.442)	(0.609)	(0.423)	(0.577)
gdp L2	-0.0506	-0.0787	-0.0412	-0.132**	-0.0957*	-0.0940	-0.0677	-0.147*	-0.109*	-0.133**
	(0.0665)	(0.0594)	(0.0633)	(0.0516)	(0.0533)	(0.0567)	(0.0647)	(0.0873)	(0.0579)	(0.0652)
coord	-0.0948	-0.0285	-0.0573	-0.0462	-0.0528	-0.231	-0.150	-0.442	-0.294	-0.288
	(0.106)	(0.113)	(0.132)	(0.124)	(0.138)	(0.171)	(0.178)	(0.270)	(0.188)	(0.273)
Observations	138	137	134	125	118	109	95	80	72	61
R-squared	0.125	0.103	0.174	0.209	0.234	0.316	0.168	0.272	0.260	0.278
decade trend	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
base hour level	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
restrict to recoveries	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Explaining the cumulative growth of hours worked per worker after the trough using one observation per cycle

Lastly, the following robustness analyses have been conducted:

- Restricting observations to being 1 to 16 quarters after through, so that at least one of the trough_1-16 dummy is equal to one (and dropping one dummy for collinearity), does not changes the conclusion. This specification has been kept and all results presented above are restricted to being during a recovery.
- Dropping the US does not change the results, even though this test is probably meaningless as all estimations are done with fixed country effects.
- The results are robust to using an alternative definition of financial crises, such as the financial crisis measure developed by Eichengreen & Bordo or the one developed by Laeven and Valencia (results are reported below).
- The results are robust, with only minor changes, to alternative choices in the measure of the business cycle trough GDP growth rate: controlling for GDP growth

rate over the last 4 quarters, the same lagged by the periods, does not impact the conclusions.

Employment rate recovery										
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	1 quarter	2 quarters	3 quarters	4 quarters	5 quarters	6 quarters	7 quarters	8 quarters	9 quarters	10 quarters
fin crisis LV	-0.173*** (0.0616)	-0.393*** (0.0961)	-0.521*** (0.122)	-0.832*** (0.151)	-1.173*** (0.180)	-1.428*** (0.209)	-1.617*** (0.228)	-1.879*** (0.250)	-2.010*** (0.266)	-2.179*** (0.284)
gdp L2	0.0664*** (0.0120)	0.198*** (0.0132)	0.301*** (0.0124)	0.344*** (0.0122)	0.374*** (0.0126)	0.398*** (0.0131)	0.413*** (0.0135)	0.416*** (0.0139)	0.420*** (0.0141)	0.418*** (0.0143)
trough#fin_crisis_LV	-0.373*** (0.144)	-0.00175 (0.222)	0.0789 (0.278)	0.581* (0.337)	1.150*** (0.421)	1.504*** (0.499)	2.006*** (0.771)	1.268 (1.030)	0.550 (2.142)	0.333 (2.294)
coord	0.0374** (0.0169)	0.0695*** (0.0262)	0.0952*** (0.0330)	0.125*** (0.0403)	0.163*** (0.0479)	0.202*** (0.0551)	0.257*** (0.0615)	0.309*** (0.0682)	0.370*** (0.0741)	0.446*** (0.0797)
Observations	1,596	1,583	1,570	1,560	1,552	1,542	1,533	1,525	1,515	1,504
R-squared	0.094	0.197	0.342	0.421	0.467	0.500	0.524	0.534	0.546	0.552
decade trend	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
base empl rate level	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
restrict to recoveries	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Explaining the cumulative growth of the employment rate after the trough using Laeven and Valencia's financial crisis definition

Hours worked in the recovery										
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	1 quarter	2 quarters	3 quarters	4 quarters	5 quarters	6 quarters	7 quarters	8 quarters	9 quarters	10 quarters
fin crisis (LV)	0.186 (0.140)	0.217 (0.133)	0.377*** (0.143)	0.448*** (0.167)	0.402** (0.168)	0.450** (0.184)	0.447** (0.189)	0.375* (0.200)	0.439** (0.200)	0.485** (0.211)
gdp L2	0.0121 (0.0271)	-0.00966 (0.0180)	0.0278* (0.0142)	0.0432*** (0.0132)	0.0449*** (0.0113)	0.0447*** (0.0110)	0.0437*** (0.0106)	0.0385*** (0.0105)	0.0416*** (0.00988)	0.0424*** (0.00979)
trough_1#fin_crisis LV	-0.148 (0.338)	-0.0250 (0.317)	0.266 (0.335)	0.351 (0.385)	1.015** (0.395)	1.083** (0.441)	1.716*** (0.643)	2.978*** (0.867)	1.999 (1.470)	2.915* (1.548)
coord	-0.0350 (0.0378)	-0.0495 (0.0358)	-0.0816** (0.0381)	-0.0876** (0.0438)	-0.103** (0.0437)	-0.113** (0.0470)	-0.133*** (0.0494)	-0.154*** (0.0526)	-0.168*** (0.0535)	-0.175*** (0.0565)
Observations	1,340	1,329	1,318	1,310	1,303	1,296	1,289	1,282	1,274	1,267
R-squared	0.025	0.044	0.070	0.084	0.113	0.131	0.141	0.161	0.184	0.203
decade trend	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
base hour level	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
country FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
restrict to recoveries	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Explaining the cumulative growth of hours worked per worker after the trough using Laeven and Valencia's financial crisis definition

4 Conclusion

Financial crises lead to different recovery patterns in terms of employment rate and hours per worker. Multiple mechanisms could be at play behind this results and should be explored in further work. Beside the needed work on potential mechanisms, this paper also highlights the importance to decompose total hours worked into the intensive (hours worked per worker) and the extensive (employment rate) margins.

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