Catastrophic Job Destruction

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DISCLAIMER: The views expressed are our own, and not necessarily the ones of the Bank of Portugal.

Athens, May 2013
"Portugal is in serious trouble. Productivity growth is anemic. Growth is very low. The budget deficit is large. The current account deficit is very large. In the absence of policy changes, the most likely scenario is one of competitive disinflation, a period of sustained high unemployment until competitiveness has been reestablished." (Portuguese Economic Journal, Olivier Blanchard, 2007).
"...from 1995 to 2001 the large decrease in nominal interest rate (panel 1) fueled an expansion in private expenditure (panel 2) financed by debt (panel 3). The increase in demand pushed nominal labor compensation to run 6 percent per annum, a rate well above productivity, and GDP inflation to increase to 4 percent per annum. The result was a large and rapid loss in competitiveness vis--vis the eurozone partners (panel 4)." (Francesco Franco, 2013)
Figure: Portuguese macroeconomic imbalances
A period of sustained unemployment

**Figure**: The evolution of the unemployment rate - Portugal 1984-2012

Source: INE
without parallel with other recessions

Figure: Unemployment rate recovery across recessions Portugal

Carneiro, Portugal, and Varejão (2013)
and a severe employment decline

Figure: Employment rate recovery across recessions Portugal

Carneiro, Portugal, and Varejão (2013)
Long-term unemployment sharply increased

Figure: Mean elapsed unemployment duration
Elapsed unemployment duration

Figure: Elapsed unemployment duration
Unemployment Duration

- **Hazard function:**

\[ h(t) = ph_1(t) + (1 - p)h_2(t) \]

\[ h(t) = p\lambda_1 + (1 - p)\lambda_2 \]

- **Likelihood function:**

\[ L(\lambda_1, \lambda_2, p|t) = \prod_{i=1}^{n} p[e^{-\lambda_1 t_i} \lambda_1] + (1 - p)[e^{-\lambda_2 t_i} \lambda_2] \]
## Unemployment duration changes

**Table**: The distribution of unemployment duration

<table>
<thead>
<tr>
<th></th>
<th>2001-2002</th>
<th>2011-20012</th>
</tr>
</thead>
<tbody>
<tr>
<td>short-term $\lambda_1$</td>
<td>0.158</td>
<td>0.167</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.013)</td>
</tr>
<tr>
<td>long-term $\lambda_2$</td>
<td>0.045</td>
<td>0.044</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>fraction of long-term</td>
<td>0.253</td>
<td>0.696</td>
</tr>
<tr>
<td>mean duration (months)</td>
<td>10.415</td>
<td>17.549</td>
</tr>
<tr>
<td>N</td>
<td>7045</td>
<td>21260</td>
</tr>
</tbody>
</table>

Source: Employment survey, INE.
Method


\[
\log w_{it} = \alpha_i + \gamma_t + \beta X_{it} + \sum_{k \geq -6}^6 D_{it}^k \xi_k + \epsilon_{it}
\]


\[
\log w_{it} = \alpha_i + \omega_{it} + \gamma_t + \beta X_{it} + \sum_{k \geq -6}^6 D_{it}^k \xi_k + \epsilon_{it}
\]
The Sources of the wage losses of the displaced workers (Raposo, Portugal and Carneiro, 2012)

Figure: Monthly earnings loss of displaced workers
Summary

- Unemployment rates tripled
- Employment declined dramatically
- Unemployment duration lengthen significantly from already high values
- The share of long-term unemployed reached almost 70 percent
- Earning losses of displaced workers are severe and persistent
- Catastrophic destruction of specific human capital of low-skilled workers
Navigation

- Macroeconomic imbalances
- Evidence on job destruction and other labor market outcomes
- Micro evidence on job destruction amplifying mechanisms:
  - The credit channel
  - The wage rigidity channel
  - The labor market segmentation channel
- Other channels (not addressed):
  - Negative aggregate demand shocks (role of fiscal multipliers)
  - Combination of job security with generous unemployment benefits (Ljungqvist and Sargent)
  - Hysteresis (Blanchard and Summers)
interest rate fragmentation

![Graph showing Interest Rates on New Loans to Firms (Percent) for Portugal, Ireland, Spain, Italy, and Germany. The graph highlights the varying interest rates across these countries from January 2008 to July 2012. The source is the European Central Bank.](image-url)
Empirical strategy

Time trends in the standing debts:

\[ \log \text{Debt}_{fbt} = \alpha_{fb} + \gamma_t + \epsilon_{fbt} \]

- \( \text{Debt}_{fbt} \) denotes the amount of debt of firm \( f \) to bank \( b \) in quarter \( t \);
- \( \alpha_{fb} \) is a firm-bank match specific fixed effect;
- \( \gamma_t \) is a quarter fixed effect;
- \( \epsilon_{fbt} \) is an idiosyncratic error term.
Credit crunch

Figure: Time trend in firms debt levels
Failure function

Failure regression (Probit regression model):

$$\text{Prob}(\text{Exit}_{ft+1} = 1) = \Phi(\alpha_0 + \alpha_1 \log \text{Sales}_{ft} + \alpha_2 \log \text{TFP}_f + \log \text{Debt}_{ft} + \alpha_3 \log \text{Wages}_{ft} + \alpha_4 \log \text{Workers}_{ft} + \delta_t + \xi_t r_{ft} + \epsilon_{ft})$$

- $\text{Exit}_f = 1$ means that firm $f$ exited at year $t + 1$;
- $\text{Sales}$ is the value of shipments;
- $\text{TFP}$ is an estimate of total factor productivity;
- Debt is the amount of outstanding debt;
- Wages is the wage bill divided by the number of workers;
- Workers corresponds to the size of the workforce;
- $r$ is a measure of the the firm-specific interest rate;
- $\epsilon_{ft}$ is an idiosyncratic error term.
Table: The determinants of firm closure (probit regression)

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>log sales</td>
<td>-0.174</td>
<td>0.018</td>
</tr>
<tr>
<td>tfp</td>
<td>-0.232</td>
<td>0.016</td>
</tr>
<tr>
<td>log debt</td>
<td>0.105</td>
<td>0.009</td>
</tr>
<tr>
<td>log wage</td>
<td>0.051</td>
<td>0.030</td>
</tr>
<tr>
<td>log L</td>
<td>0.144</td>
<td>0.009</td>
</tr>
<tr>
<td>firm interest rate 2006</td>
<td>0.998</td>
<td>0.115</td>
</tr>
<tr>
<td>firm interest rate 2007</td>
<td>0.849</td>
<td>0.108</td>
</tr>
<tr>
<td>firm interest rate 2008</td>
<td>0.962</td>
<td>0.099</td>
</tr>
<tr>
<td>firm interest rate 2009</td>
<td>1.064</td>
<td>0.106</td>
</tr>
<tr>
<td>firm interest rate 2010</td>
<td>1.185</td>
<td>0.130</td>
</tr>
</tbody>
</table>

Source: Informacao Empresarial Simplificad (N=79 988).
Labor demand

Dynamic labor demand (fixed-effects model):

$$\ln L_{ft} = \alpha_f + \rho \ln L_{ft-1} + \alpha_1 \log Sales_{ft} + \alpha_2 \log Wages_{ft}$$

$$+ \delta_t + \xi_t r_{ft} + \epsilon_{ft}$$

- $L_{ft}$ corresponds to the number of workers at firm $f$ in year $t$;
- $\alpha_f$ is the firm fixed effect.
**Labor demand**

**Table**: Dynamic Labor Demand (fixed effects estimation)

<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
<th>Standard error</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\log L_{t-1}$</td>
<td>0.240</td>
<td>0.006</td>
</tr>
<tr>
<td>log sales</td>
<td>0.352</td>
<td>0.007</td>
</tr>
<tr>
<td>log wage</td>
<td>-0.427</td>
<td>0.016</td>
</tr>
<tr>
<td>firm interest rate 2006</td>
<td>-0.019</td>
<td>0.014</td>
</tr>
<tr>
<td>firm interest rate 2007</td>
<td>-0.028</td>
<td>0.013</td>
</tr>
<tr>
<td>firm interest rate 2008</td>
<td>-0.028</td>
<td>0.011</td>
</tr>
<tr>
<td>firm interest rate 2009</td>
<td>-0.039</td>
<td>0.017</td>
</tr>
<tr>
<td>firm interest rate 2010</td>
<td>-0.118</td>
<td>0.025</td>
</tr>
<tr>
<td>firm interest rate 2011</td>
<td>-0.106</td>
<td>0.025</td>
</tr>
</tbody>
</table>

Source: Informacao Empresarial Simplificada (N=106 332).
Summary

- Worrying interest rate fragmentation
- Suggestive evidence of credit crunch impacting on firm’s the ability to borrow
- Financially distressed firms:
  - Shut-down (1 percentage point, around 20 percent of total closures)
  - Contract employment (1 to 3 percent of total employment)
The wage setting system in Portugal

Wage bargaining system in Portugal prevailing over the sample period:

- Mandatory minimum wage
- Collective bargaining takes place at a sectoral level, but mandatory extensions are commonplace
- Around 30,000 job-title wage floors are settled each year
- Despite very low unionization rates (less than 10 percent)
Nominal wage rigidity

The wage rigidity channel

Carneiro, Portugal, and Varejão (2013) Catastrophic Job Destruction
Figure: Incidence of minimum wages (1992-2009)
Incidence of nominal wage freezes on surviving matches, 1992-2009

Figure: Incidence of nominal wage freezes on surviving matches, 1992-2009
The wage rigidity channel

Wage change distribution, stayers, 2010-2012

Changes in wages (%), 2010
Wage change distribution, stayers, 2010-2012

Changes in wages (%), 2011
The wage rigidity channel

Wage change distribution, stayers, 2010-2012

Changes in wages (%), 2012
The cyclicality of real wages, Carneiro, Guimarães, and Portugal, AEJ Macro (2012)

\[ y_{ijft} = \lambda_i + \theta_f + \gamma_j + \xi cycle_t + \beta X_{ift} + \epsilon_{ijft} \] (1)

- \( y_{ijft} \) represents the logarithm of the hourly wage for each individual \( i \), in job \( j \), working for firm \( f \) in year \( t \).
- \( X_{ift} \) are observed time-varying characteristics of individual \( i \) and firm \( j \) in year \( t \).
  - Workers time-varying characteristics (age, age squared, seniority, and seniority squared)
  - Firms time-varying characteristics (log of size)
- \( \lambda_i \) is a worker fixed effect
- \( \theta_f \) is a firm fixed effect
- \( \gamma_j \) is a job-title fixed effect
- \( \epsilon_{ijft} \) is an idiosyncratic error term
wage cyclicality

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>stayers</td>
<td>-2.460</td>
<td>0.002</td>
</tr>
<tr>
<td>new-hires</td>
<td>-3.455</td>
<td>-0.341</td>
</tr>
</tbody>
</table>

Source: Quadros de Pessoal.
Insider-outsider wages (Guimarães, Martins and Portugal, 2013)

\[ y_{ift} = \theta_f + \gamma_f \text{wage}_{fjt}^{\text{insider}} + \alpha_f \text{wage}_{jt}^{\text{outsider}} + \phi_f \text{wage}_{t}^{\text{minimum}} + \epsilon_{ift} \]  

- \( y_{ift} \) represents the logarithm of the monthly wage of a newly-hired worker \( i \), at firm \( f \), at job-title \( j \), in year \( t \).
- \( \text{wage}^{\text{insider}} \) is the firm’s ruling wage for workers with the same job-title.
- \( \text{wage}^{\text{outsider}} \) is the bargained wage for workers with the same job-title.
- \( \text{wage}^{\text{minimum}} \) is the mandatory minimum wage.
- \( \theta_f \) is a firm fixed effect.
- \( \gamma_f, \alpha_f, \phi_f \) are firm-specific regression coefficients.
- \( \epsilon_{ift} \) is an idiosyncratic error term.
The wage rigidity channel

**Figure:** The determinants of entry wages

Inside Outsider Wages

- **Kernel:** epanechnikov, bandwidth = 0.0165

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Carneiro, Portugal, and Varejão (2013)
Empirical strategy: the role of bargained wages

wage rididity and worker flows:

\[
\text{hiring rate}_{ft} = \xi \hat{\alpha}_f + \delta_t + \beta X_{ft} + \epsilon_{ft}
\]

\[
\text{separation rate}_{ft} = \xi \hat{\alpha}_f + \delta_t + \beta X_{ft} + \epsilon_{ft}
\]

\[
\text{net job creation}_{ft} = \xi \hat{\alpha}_f + \delta_t + \beta X_{ft} + \epsilon_{ft}
\]

\[
\text{failure rate}_{ft} = \xi \hat{\alpha}_f + \delta_t + \beta X_{ft} + \epsilon_{ft}
\]

where \( X \) includes industry and regional dummies, the age of the firm, and its size.
Empirical strategy: the role of minimum wages

Wage rigidity and worker flows:

\[
\text{hiring rate}_{ft} = \xi \hat{\phi}_f + \delta_t + \beta X_{ft} + \epsilon_{ft}
\]

\[
\text{separation rate}_{ft} = \xi \hat{\phi}_f + \delta_t + \beta X_{ft} + \epsilon_{ft}
\]

\[
\text{net job creation}_{ft} = \xi \hat{\phi}_f + \delta_t + \beta X_{ft} + \epsilon_{ft}
\]

\[
\text{failure rate}_{ft} = \xi \hat{\phi}_f + \delta_t + \beta X_{ft} + \epsilon_{ft}
\]

Where \( X \) includes industry and regional dummies, the age of the firm, and its size.
# Wage rigidity and labor market flows

## Table: Bargained wages and labor market flows

<table>
<thead>
<tr>
<th></th>
<th>Hiring rate</th>
<th>Separation rate</th>
<th>Net job creation</th>
<th>Failure rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bargained weight</td>
<td>-0.034</td>
<td>-0.006</td>
<td>-0.028</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>(0.016)</td>
<td>(0.013)</td>
<td>(0.014)</td>
<td>(0.005)</td>
</tr>
</tbody>
</table>

## Table: Minimum wages and labor market flows

<table>
<thead>
<tr>
<th></th>
<th>Hiring rate</th>
<th>Separation rate</th>
<th>Net job creation</th>
<th>Failure rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>MW weight</td>
<td>0.062</td>
<td>0.087</td>
<td>-0.025</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.018)</td>
<td>(0.016)</td>
<td>(0.006)</td>
</tr>
</tbody>
</table>

Source: Martins, Guimaraes, and Portugal (2013)
Summary

- Downward nominal wage rigidity is severe
- The wage setting system accentuates DNWR
  - through extension mechanisms
  - leading to nearly 30,000 wage floors
- Minimum wage hikes were triggered before the crisis
- Wage freezes generalized to unprecedented levels
- Real wage cyclicality faded
- Suggestive evidence that external wage restriction led to job destruction
Job Creation and Job Destruction (1992-2009)

- Job Creation by Expanding Firms
- Job Creation by Newly-created Firms
- Job Destruction by Downsizing Firms
- Job Destruction by Closing Firms

Carneiro, Portugal, and Varejão (2013)
The labor market segmentation channel

Share of temporary employment in total employment

Carneiro, Portugal, and Varejão (2013)
Labor market segmentation channel

Figure: The relationship of hires and separations to net employment variation
Labor market segmentation channel

Figure: The relationship of hires to net employment variation, by contract type

[Graph showing the relationship between hires and net employment variation for open-ended and temporary contracts]
The labor market segmentation channel

**Figure**: The relationship of separations to net employment variation, by contract type
Summary

- High differences between firing costs between open-ended and fixed-term contracts
  - increased the number of temporary workers
  - leading to excessive worker churning
- Suggestive evidence that fixed-term contracts speeded up job destruction by facilitating job separations in recessions
Conclusions

- Job destruction
  - flows into unemployment
  - long-term unemployment
  - human capital destruction

Three mechanisms seemed to play a role:

- credit channel
- wage rigidity channel
- labor market segmentation channel

What can be done?

- fiscal devaluation (missed)
- reduce labor costs through social security taxes (at least for low-wage workers)
- reduce labor market segmentation through single contracts for new hires
- credit constraints?