What effects is EMU having on the euro area and its member countries?
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Leading paper:

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The Impact of the Euro on Financial Markets

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Disclaimer: The views expressed in this paper are only the authors’ and do not necessarily reflect the views of the ECB or the Eurosystem
Introduction

- The Lisbon Agenda has put the integration of the European financial system high on the agenda
- Objective: Increase the competitiveness of the European economy
- Various reforms over time, for example
  - Single European Act 1987
  - Liberalization of capital flows 1990
  - Second Banking Directive 1992
  - Financial Services Action Plan 1999-2005
  - Green Paper on financial sector policies 2005-2010
- EMU is, arguably, the largest monetary union in human history and one major factor in the integration and competitiveness of the European financial system
Plan of the paper and presentation

• We look at changes in the European financial system and at the impact of the euro from two main perspectives

• **Micro-financial** developments (Part I)
  – Objective: Integration of European financial markets
  – Short term: Time-varying return correlations
  – Long term: Structural breaks in spillover probabilities

• **Macro-financial** developments (Part II)
  – Objective: Interaction of monetary policy with financial markets through the term structure of interest rates
  – Changes in macroeconomic fundamentals
  – Changes in risk premia

• For central bankers both are important and belong together
Part I

Asset return dynamics before and after the euro: Integration of stock and government bond markets
Time-varying correlations and variances

- Dynamic conditional correlation GARCH model by Engle (2002)
  - Daily volatilities and correlations
  - Parametric estimation
- Estimation: Two-step procedure
  - (i) Univariate GARCH models
  - (ii) Model correlation of standardized asset returns
- Structural breaks
  - dummy variable in the covariance matrix corresponding to the introduction of the euro

\[
Q_t = \bar{Q}_1(1-a-b)(1-d_t) + \bar{Q}_2(1-a-b)d_t + a\varepsilon_{t-1}\varepsilon'_{t-1} + bQ_{t-1}
\]

\[
Corr_t = \text{diag}\left\{Q_t\right\}^{-1/2}Q_t\text{diag}\left\{Q_t\right\}^{-1/2}
\]
Conditional correlations of equity index returns

Stock returns: Conditional correlations vs Germany

- France
- UK
- Italy
- Netherlands
- Spain
- Sweden
Conditional correlations of government bond returns

10 Year government bond returns: Conditional correlations vs Germany

- France
- Italy
- Netherlands
- Spain
- UK
Spillover probabilities from quantile regressions

• Basic tool of analysis: Conditional probability

\[ x_t, y_t \quad \text{Market returns}, \quad q_{\theta_{yt}}, q_{\theta_{xt}} \quad \theta\text{-quantiles, } \theta \in (0,1) \]

\[ p_t(\theta) \equiv \begin{cases} 
Pr \left[ y_t < q_{\theta_{yt}}^y \mid x_t < q_{\theta_{xt}}^x \right] & \text{if } \theta \leq 0.5 \\
Pr \left[ y_t > q_{\theta_{yt}}^y \mid x_t > q_{\theta_{xt}}^x \right] & \text{if } \theta > 0.5 
\end{cases} \]

• Three step procedure:
  – Estimate individual time-varying quantiles for X and Y
  – Construct indicator functions \( I(y_t < q_{\theta_{yt}}^y) \) and \( I(x_t < q_{\theta_{xt}}^x) \)
  – Run OLS regression with euro effect dummy \( D_t \):

\[ I_t(y_t < q_{\theta_{yt}}^y) = \alpha_{\theta_t} I_t(x_t < q_{\theta_{xt}}^x) + \gamma_{\theta_t} I_t(x_t < q_{\theta_{xt}}^x)D_t + \varepsilon_t \]
Illustration of integration in the “co-movement box”

Perfect Integration

Increased integration

Decreased integration

Perfect Segmentation
Equity market integration

France / Germany

- Independence line
- Prob. before 1999
- Prob. after 1999
- 95% conf. interval
Equity market integration

Euro area / Japan

1.00
0.75
0.50
0.25
0.00

1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97

- independence line
- prob. before 1999
- prob. after 1999
- 95% conf. interval
Equity market integration

Euro area / USA

- independence line
- prob.before 1999
- prob.after 1999
- 95% conf.interval
Government bond market integration

![Graph showing the integration of government bond markets between France and Germany with indication of independence line, probability before and after 1999, and 95% confidence interval.](image-url)
**Government bond market integration**

Large versus small euro area country bond markets

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**Big countries / Germany**

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**Small countries / Germany**
Part II

Asset pricing before and after the euro: The behavior of the term structure
Affine macro-finance model: Macro-economy

- Inflation:
  \[ \pi_t = \mu_\pi E_t[\pi_{t+1}] + (1 - \mu_\pi)\pi_{t-1} + \delta_t x_t + \varepsilon_t^\pi \]

- Output gap:
  \[ x_t = \mu_x E_t[x_{t+1}] + (1 - \mu_x)x_{t-1} - \zeta_r (r^- - E_t[\pi_{t+1}]) + \varepsilon_t^x \]

- Forward-looking Taylor rule (\(r_t\) is policy instrument):
  \[ r_t = (1 - \rho)\beta(E_t[\pi_{t+1}] - \pi^*) + \gamma x_t + \rho r_{t-1} + \eta_t \]

- Perceived inflation target (unobservable):
  \[ \pi_t^* = \phi_\pi \pi_{t-1}^* + \nu_t^\pi \]
Macro model solution

- Let $X_1$ be the vector of predetermined variables, which include lags of $x$, $\pi$, $r$, contemporaneous values of $\pi^*$, and the shocks.
- Let $X_2$ be the vector of not predetermined variables, which include the contemporaneous values of $x$ and $\pi$ and forward-looking expectations of these variables as well as $r_t$.
- The solution provides two matrices $M$ and $C$ such that:
  
  $$ X_{1,t} = MX_{1,t-1} + \xi_{1,t} $$
  
  $$ X_{2,t} = CX_{1,t} $$
Term structure of bond yields

- Yield to maturity are derived assuming absence of arbitrage opportunities and specifying a process for the stochastic discount factor (sdf)
- Market prices of risk are assumed to be affine in the state vector (Duffie, 2002), i.e. the state of the economy determines the compensation for bearing risk
- The macro model, coupled with the assumptions on the sdf, determines yields to maturity:

\[ y_t^n = A_n + B'_n X_{1,t} \]
Term structure of bond yields

• Yields to maturities depend on predetermined variables through:
  – Expectations on the short term interest rate
  – A risk (or term) premium, i.e. a compensation for risk
Impact of the euro on fundamentals

- Inflation:

\[
\pi_t^{\text{pre-euro}} = 0.132 E_t \left[ \pi_{t+1} \right] + (1 - 0.132) \pi_{t-1} + 0.038 \times 10^{-2} x_t + \epsilon_t^\pi \\
\pi_t^{\text{euro}} = 0.152 E_t \left[ \pi_{t+1} \right] + (1 - 0.152) \pi_{t-1} + 0.905 \times 10^{-2} x_t + \epsilon_t^\pi
\]

\[
\sigma_{\pi} \times 10^2 = 0.022 \\
\sigma_{\pi} \times 10^2 = 0.015
\]

- Output gap:

\[
x_t^{\text{pre-euro}} = 0.303 E_t \left[ x_{t+1} \right] + (1 - 0.303) x_{t-1} - 0.027 (r_t - E_t \left[ \pi_{t+1} \right]) + \epsilon_t^x \\
x_t^{\text{euro}} = 0.396 E_t \left[ x_{t+1} \right] + (1 - 0.396) x_{t-1} - 0.109 (r_t - E_t \left[ \pi_{t+1} \right]) + \epsilon_t^x
\]

\[
\sigma_x \times 10^2 = 0.097 \\
\sigma_x \times 10^2 = 0.041
\]

- Monetary policy rule:

\[
r_t^{\text{pre-euro}} = (1 - 0.976) \left( 2.087 \left( E_t \left[ \pi_{t+1} \right] - \pi_t^* \right) + 1.243 x_t \right) + 0.976 r_{t-1} + \eta_t \\
r_t^{\text{euro}} = (1 - 0.925) \left( 1.016 \left( E_t \left[ \pi_{t+1} \right] - \pi_t^* \right) + 0.404 x_t \right) + 0.925 r_{t-1} + \eta_t
\]

\[
\sigma_{\eta} \times 10^2 = 0.040 \\
\sigma_{\eta} \times 10^2 = 0.014
\]
Impact of the euro on risk premia

Term structure of average risk premia
Impact of the euro on risk premia

Initial response of risk premia to a monetary policy shock
Impact of the euro on risk premia

Estimated risk premia and components of premia
Conclusions

- Paper combined a micro-financial and a macro-financial perspective on the effects of the euro
- **Micro: Financial integration**
  - Reduced bond market volatility but not stock markets
  - Significantly increased stock market return correlations among large but not small euro area countries
  - But also some increase with the US, but not global
  - Increased bond market correlations, also several small
  - Co-movements of stock and bond markets signal significant progress in integration
  - Catalyst effect of the euro
  - Benefits sovereigns, investors and corporations
  - Financial integration a relatively successful program under the Lisbon Agenda
  - Other areas: Banking, retail etc.
Conclusions

• **Macro:** Term structure and monetary policy
  – **Variability** of risk premia has decreased with EMU, related to a reduction in macroeconomic volatility
  – **On average,** however, they are similar to before
  – Increases in the market prices of risk have offset the reduction in macroeconomic volatility
  – Fundamental drivers of risk premia have not changed
  – Hence, the central bank can extract rate expectations from the yield curve equally well as before EMU
  – It can even be more confident in the accuracy of its analysis due to the reduced variability of premia
  – Communication with the market may be more effective

• Euro had significant positive effects on markets, although also other factors may have played a role
Annex

Further charts
Equity market integration

United Kingdom / Germany

Equity market integration
Government bond market integration

United Kingdom / Germany

- independence line
- prob.before 1999
- prob.after 1999
- 95% conf.interval
Impact of the euro on risk premia

Impulse response of inflation to a monetary policy shock