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# LUXEMBOURG

## SELECTED ISSUES

May 2016

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# LUXEMBOURG

## SELECTED ISSUES

April 20, 2016

Approved By
**European Department**

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# INVESTMENT FUND-BANK LINKAGES: LUXEMBOURG AS A CASE STUDY[1]

*The Luxembourg investment fund industry, second in the world after the US, has grown rapidly since the Global Financial Crisis. The latest developments in the international financial system and the growing risks in the fund industry can also be observed in Luxembourg. Linkages between investment funds and banks are an important trait of the international financial system, including in Luxembourg. While investors bear the risks of investment funds, shocks could be transmitted to the banking system domestically and abroad, and to the real economy. In this context, it is important that oversight of investment funds and asset managers should continue to evolve as international standards and practices are strengthened, and that risk monitoring and regulatory frameworks take into account and further investigate the linkages between banks and investment funds.*

## A. Introduction

**1. The chapter studies the linkages between investment funds and banks and the implications for macro-financial stability in Luxembourg and for global financial spillovers.** Luxembourg has the second largest investment fund industry in the world after the US. As risks in investment funds are attracting attention globally, the linkages between Luxembourg funds and banks, an important trait of the financial system, could contribute to transmitting financial volatility to the financial system and the real economy. The financial system accounts for ¼ of GDP, about 10 percent of employment and 18 percent of tax revenues. Moreover, the high interconnections of Luxembourg's financial system with the rest of the world, including through these fund-bank linkages, make it a recipient and conduit of global financial volatility. These characteristics highlight the importance of (i) strong oversight of investment funds and of their management companies, in line with evolving international standards; and (ii) risk monitoring, financial stability analysis and regulatory frameworks taking into account the linkages between banks and investment funds, including at the level of the Single Supervisory Mechanism (SSM).

## B. Investment Fund Industry: Development and Regulatory Framework

**2. Luxembourg's investment funds have experienced impressive growth since the early 2000s.** Assets of investment funds have quadrupled since 2000, of which 80 percent is accounted for by net inflows and 20 percent by valuation gains. This impressive growth has made Luxembourg's fund industry second to the US and first in the EU, with €3.5 trillion of net assets in October 2015, about 70 times GDP or about one tenth of total world-wide investment funds' assets (by comparison bank assets have grown by 25 percent since 2000, to about 15 times GDP). Since the

[1] Prepared by Thierry Tressel.

end of 2008, about $^{1}/_{5}$ (or €1.16 trillion) of all new net inflows into investments funds worldwide were in Luxembourg's funds, outperforming inflows into other euro area countries' funds. The flows were driven by the rebound of global markets, the quantitative easing of major central banks, and a search for yields. During this period, exposures of investment funds to (non-financial) corporate bonds, which tend to be less liquid than other financial assets, rose from €141 billion (or 29 percent of total bond investments) at the end of 2008 to €648 billion (or 45 percent of total bond investments) in October 2015.[2] Many of the inflows went through affiliates of international asset management companies performing risk management locally.

**3. Investment fund assets tend to be volatile.** Between 2000:Q1 and 2015:Q3, funds in Luxembourg experienced 11 episodes during which the quarterly valuation effect was lower than -4 percent (about one standard deviation) among which 6 episodes took place before the end of 2007. The standard deviations of net inflows and of valuation effects, expressed in percent of total net assets, were very similar in the pre-global financial crisis period and in the post-global financial crisis period. However, episodes of aggregate net redemptions have become larger and longer lasting. While there were 6 episodes of net aggregate redemptions over a month before 2008, Luxembourg's funds did not experience any aggregate net cumulative redemption over a quarter until the third quarter of 2008. There have been five such episodes since 2008. There are also significant reallocations occurring among different investment funds, as suggested by quarterly gross inflows and outflows that amount to 55 percent of aggregate net assets on average. Bank deposits of investment funds are also volatile, with a standard deviation of their quarterly change of about €5 billion since 2009.

**Table 1. Standard Deviations**
(percent of net assets)

| | Net inflows | Valuation effects |
|---|---|---|
| 2000Q1–2007Q4 | 1.72 | 4.46 |
| 2008Q1–2015Q3 | 1.69 | 4.14 |

Source: BCL and IMF staff estimates.

**4. The growing risks embedded in the global investment fund industry have attracted attention worldwide:**[3]

- *A concentrated industry:* the top 5 asset managers have a combined market share of roughly 40 percent of world-wide investment funds.[4] High concentration increases the impact of firm level events on markets;[5]

[2] Source: BCL statistical tables 13.07 to 13.12. For evidence consistent with a search for yields by Luxembourg bond funds, see Raphael Janssen and Romuald Mohrs, 2015, "The Interest Rate Sensitivity of Luxembourg's Bond Funds: Results from a Time Varying Model", *Banque Centrale du Luxembourg* Cahier d'Etude 98.

[3] The Financial Stability Bureau has initiated a monitoring report of the shadow banking system including investment funds (Financial Stability Board, "Global Shadow Banking Monitoring Report 2015", November 12, 2015, Basel), it has set a work plan to assess risks in the asset management industry, and has warned of growing risks (press release September 25, 2015, "Meeting of the Financial Stability Board in London on September 35", Basel).

[4] Sources: European Fund and Asset Management Association, Office of Financial Research and IMF staff.

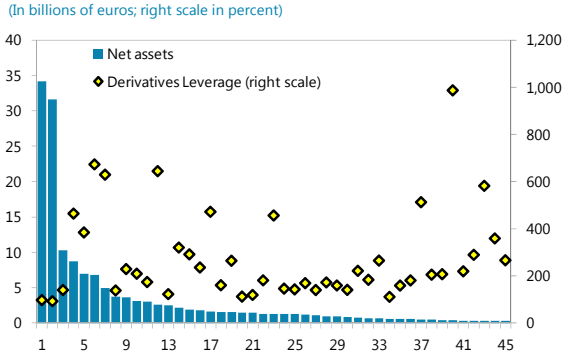
- *Firm level considerations*: an asset manager's reputation underpins its ability to attract and keep clients and deliver valuable services. The cross-border dimension and ownership linkages, important in the context of Luxembourg, could complicate risk management and supervision. Indeed, almost all G-SIFIS have asset management arms, and they have local affiliates in Luxembourg.

- *Search for yields:* in a low interest rate environment, exposures have shifted to more risky and less liquid assets (such as high yield corporate bonds and emerging markets). Exposure of Luxembourg funds to corporate bonds had risen from €141 billion (or 29 percent of total bond investments) at the end of 2008 to €648 billion (or 45 percent of total bond investments) in October 2015.

- *Liquidity mismatch:* investment fund investments, especially in bonds, may be less liquid than redemption terms and conditions, making them susceptive to runs.

- *Growing leverage*: The use of derivative leverage that helps boost returns has increased significantly since the Global Financial Crisis (Global Financial Stability Report, chapter one, October 2015). While investment funds have strict cash borrowing limits in the EU, leverage can also be embedded in derivative positions, and reach high levels which require careful monitoring.[6] Leverage may amplify the impact of sudden redemptions on asset prices and on the value of the fund, also contributing to the susceptibility to runs. In Luxembourg, total gross derivative asset and liability positions on a mark-to-market basis account for 12.5 percent of financial assets of investment funds, compared with 4 percent and 1.7 percent respectively among France and Germany's investment funds.[7] While derivatives may be used for both investment (i.e., generation of returns) and for hedging purposes, they may increase risks very significantly. Several large Luxembourgish bond funds have achieved very large derivative leverage measured as the sum of the notionals of the derivatives used (Figure 1); and

**Figure 1. Sample of Luxembourg Funds with Leverage > 100 percent**




[5] Massa, Schumacher, and Wang, 2015, "Who is afraid of Blackrock", Working Paper 2015/60/FIN, INSEAD.

[6] In the EU, the Undertaking for Collective Investment in Transferable Securities (UCITS) Directive expressly limits borrowing from banks to 10 percent of net assets and derivatives leverage to 100 percent of net assets (in term of commitments). However, the directive's implementing measures allow mutual funds to use an advanced value-at-risk methodology to measure their market risk, thus permitting mutual funds to exceed the 100 percent limit as long as the value at risk is within certain bounds.

[7] Source: OECD.

- *Securities lending activities:* Securities financing of asset managers and of investment funds has been identified as a key risk by the Financial Stability Board. A survey of depository banks by the CSSF identified securities lending activities by investment funds of about €60 billion in Luxembourg.

**5. Funds and banks are interconnected.** Risks emanating from either investment funds or the banking sector can be transmitted to each other through direct and indirect linkages, implicit guarantees and ownership links, among others (section C).

**6. EU investment funds have grown under a strengthened regulatory environment.** With a view to defining the highest levels of investor protection, the set of existing Directives for open-ended funds investing in transferable securities regulates the organization, risk management, monitoring and micro-prudential oversight of such funds, and imposes rules concerning stress tests of individual funds (undertaken by risk managers), diversification, liquidity and use of leverage. The Directives also define a list of eligible assets in which a fund can invest and permits a toolkit of instruments for liquidity risk management including redemption fees, gates, side pockets, suspension of redemptions.[8]

- The UCITS Directives, first adopted in 1985, regulates a 'product': units of undertakings for collective investment in transferable securities (UCITS). The Directives represent the cornerstone of EU regulation for retail investment fund products, an industry in which Luxembourg was a first mover. It has been subject to many reviews; the two latest ones took place in 2009 and in 2014. UCITS Directive IV focused on: (i) a European passport for management companies for collective portfolio management on a cross-border basis, and the possibility of mergers of UCITS and of master-feeder structures to allow economies of scale; (ii) new UCITS notification procedure for streamlining cross-border distribution of UCITS funds; (iii) providing investors with better information on the products; and: (iv) strengthening collaboration among supervisors. The UCITS Directive V adopted in 2014 focused on: (i) clarifying tasks, oversight roles, and accountability of the depository bank; (ii) setting a framework for the remuneration of UCITS managers; and: (iii) harmonizing the minimum administrative sanctions available to supervisors.

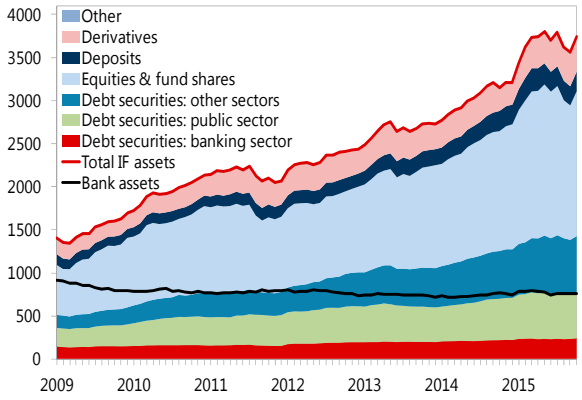
- The Alternative Investment Fund Manager Directive (AIFMD), adopted in 2011, regulates other investment funds managers established in the EU and offering funds usually targeted at professional investors, such as hedge funds, private equity funds, or real estate funds. It also covers the management, administration and marketing of these alternative investment funds (AIFs) and introduces new benchmarks for the depository functions. AIF managers are required to be registered and become subject to supervision.

[8] The legal framework provides a broad toolkit for liquidity risk management of investment funds by asset managers and regulators, as recently surveyed in an IOSCO comparative study: https://www.iosco.org/library/pubdocs/pdf/IOSCOPD517.pdf

## Figure 2. Luxembourg Investment Funds: Developments and Characteristics

### Investment Fund Assets by Assets Class

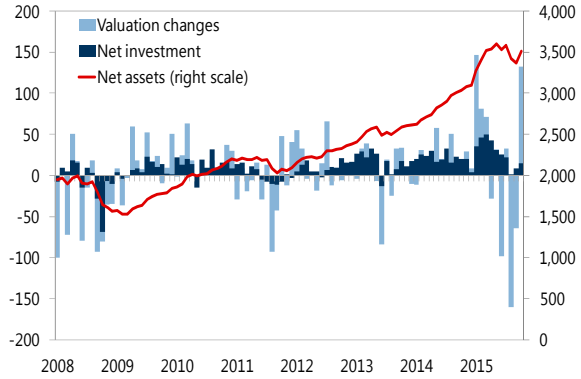
(Billions of euros)




Source: BCL.

### Net Inflows and Valuation Effects

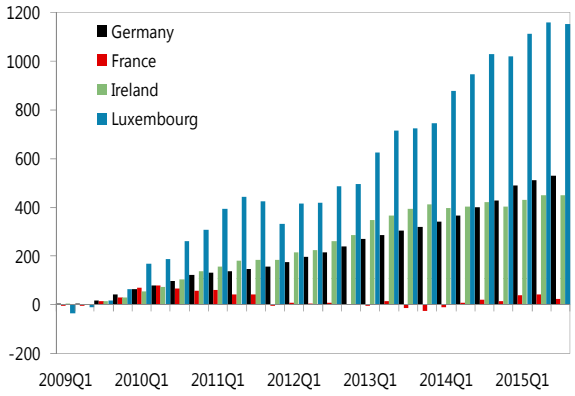
(Billions euros)




Source: BCL and IMF staff estimates.

### Cumulative Net Inflows into Funds

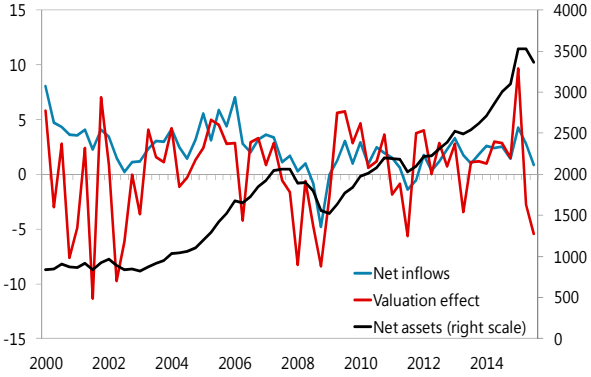
(Billions of euros)




Source: ECB.

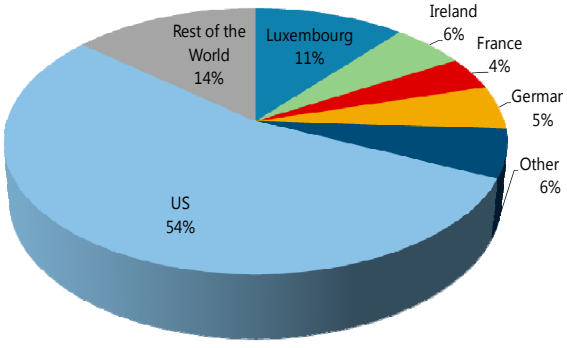
### Volatility of Investment Funds

(In percent of net assets; right scale in billions of euros)




Sources: BCL and IMF Staff estimates.

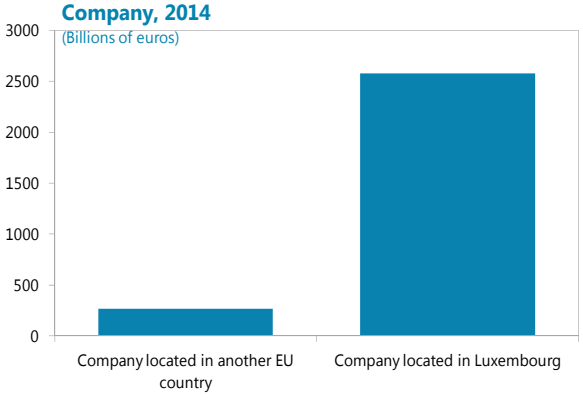
### World Market Shares, 2015Q3




Sources: EFAMA, ECB and IMF Staff estimates.

### Luxembourg UCITS by Domicile of Management Company, 2014

(Billions of euros)

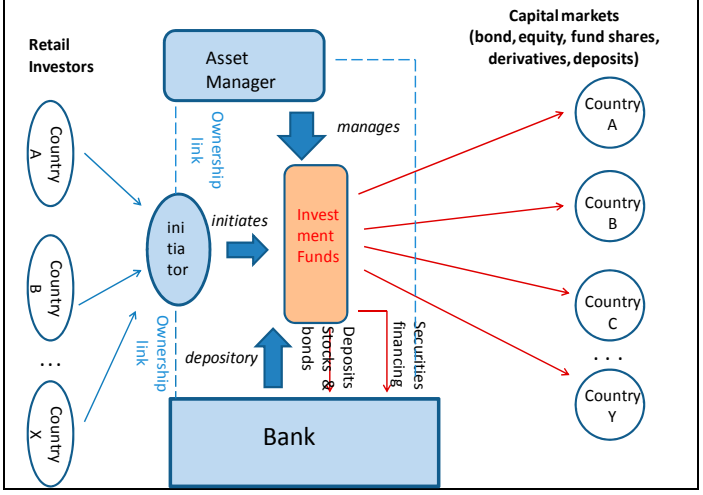



Source: CSSF.

## C. Linkages between Investment Funds and Banks: Framework and Facts

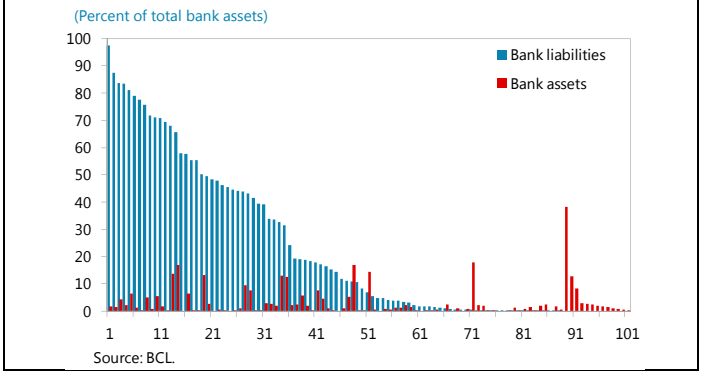
**7. Linkages between banks and investment funds are an important trait of the financial system.** Investment funds are initiated by financial institutions often part of a large banking group, and their portfolios are managed by asset management companies, that are also responsible for risk management which must be performed locally. Luxembourg investment funds hold bank deposits of about €110 billion domestically (3.1 percent of investment funds net asset value and 14.5 percent of Luxembourg's banks aggregate balance sheet), and about the same amount in banks abroad. Funds also hold significant amounts of bank bond, equity and derivative exposures domestically and abroad. These exposures to banks totaled €821 billion in 2015:Q3, 73 percent of which outside Luxembourg. In Luxembourg, banks act on their asset side as counterparties in derivative contracts, and hold some fund shares and lines of credit accounting for 1.9 percent of the aggregate balance sheet of banks. There are also significant ownership links between Luxembourg fund management companies and large banking groups. Hence, while investment funds predominantly rely on equity funding that removes contingent liabilities as investors bear the risks of investment funds, shocks affecting the investment fund industry could be transmitted to the banking system through these various links and impact Luxembourg as activity in the financial sector fluctuates.

**Figure 3. Framework of Investment Funds**




**8. Depository banks play a key role in the investment fund industry.** Depository banks of investment funds are all located in Luxembourg and may provide, besides depositary services, administrative, pricing, brokerage, and accounting services to funds. By regulation, depositaries need to be established in the same country as the investment fund.[9] The market for depository banks is very concentrated in Luxembourg, with five

**Figure 4. Individual Luxembourg Bank Exposures to Investment Funds and Money Market Funds**




[9] European Commission, 2015, "Commission Staff Working Document - Impact Assessment - Accompanying the Document: Commission Delegated Regulation supplementing Directive 2009/65/EC of the European Parliament and of the Council with regard to obligations of depositaries", Brussels, 12/17/2015.

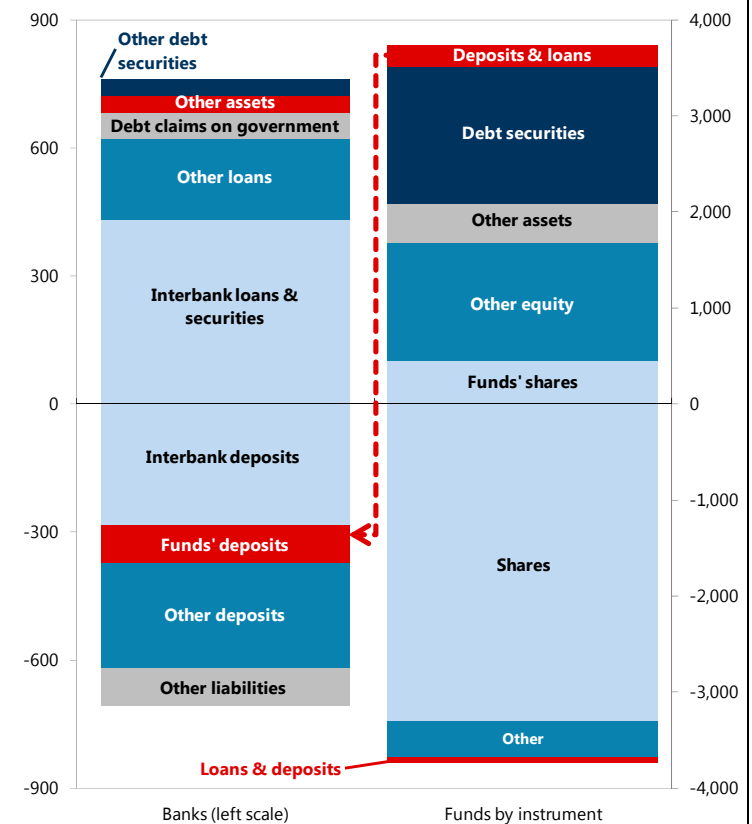
banks having 60 percent of investment fund assets under their custody. While they are legally responsible for safe-keeping these assets and earn fee income commensurate with their value, they also concentrate direct exposures, mainly through deposits and lines of credit (Figure 4). For instance, fund deposits are concentrated in their depository banks, and account for about 50 percent of their liabilities, and are lent to the parent, or finance locally held liquid assets. To respect the new liquidity requirements applicable since October 2015 on a sub-consolidated basis, depository banks in Luxembourg have to increasingly channel fund deposits into eligible high-quality liquid assets (HQLA). On the asset side of banks, lines of credit and fund shares represent about 2 percent of depository bank assets.

**9. Linkages between banks and investment funds can be summarized as follows**:[10]

- **Cash balances**. Investment funds hold large bank deposits, estimated at about €220 billion, about half of which concentrated in Luxembourg's largest depository banks. Large and sustained redemptions from investors could trigger withdrawing these deposits to avoid selling-off less liquid assets, with potentially adverse impacts on the banking system. For example, evidence provided by the BCL shows that deposits of non-monetary investment funds in Luxembourg banks declined by €6.7 billion in 2008:Q4 and by another €5 billion in 2009:Q1.

- **Other direct exposures.** At an aggregate level, and in addition to cash balances, funds hold bank debt, shares, and derivative assets vis-à-vis banks totaling about €580 billion.

**Figure 5. Bank and Investment Fund Assets and Liabilities, October 2015**




Sources: BCL, and IMF staff calculations.

- **Liquidity support.** While asset managers are legally separated from investment funds, they are allowed, among various liquidity management tools, to provide temporary credit lines to meet

[10] See also the study by the *Banque Centrale du Luxembourg*, in its 2015 Financial Stability Review.

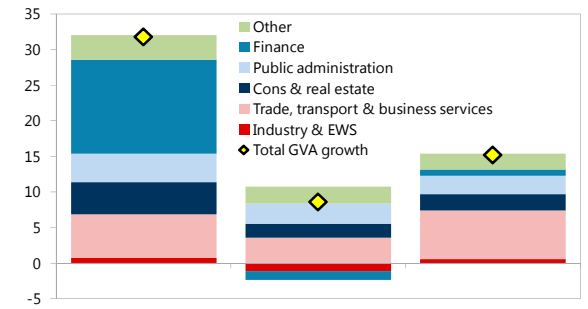
redemptions to deal with liquidity mismatches and avoid fire sales.[11] As the balance sheets of asset managers are small compared to the value of funds, such support in situations of acute stress might also come from the owners or affiliates of asset managers, including large banks or insurance companies which could also directly buy investment fund's shares.

- **Bank services.** Banks provide services to funds, such as depository services, pricing, brokerage, accounting, and sometimes share common clients with asset managers. Banks, as well as insurance companies, also serve as counterparties for securities lending by investment funds and various types of derivative contracts held by investment funds.

## D. Macro-Financial Linkages in Luxembourg

**10. The financial sector is a key contributor to economic growth in Luxembourg.** Between 2000 and 2007, the financial sector was the top contributor to gross value-added (GVA) growth. During this period, GVA increased by around ⅓ in real terms, among which 41 percent was accounted for by the growth of value-added in finance. Since the global financial crisis, the contribution of the financial sector broadly declined as a consequence of global shocks, though it recovered in recent years, while trade, transport and business services accounted for the bulk of the increase in gross value added between 2009 and 2014. The financial sector also indirectly contributes to economic growth by supplying credit and other services to various economic sectors.[12]

**Figure 6. Sectoral Contributions to GVA Growth**
(In percentage points)




Source: Haver.

**11. Regression analysis shows that growth of investment funds' assets is a significant driver of economic performance.** We regress quarterly real GDP growth (y/y) during 2000:Q1–2015:Q3 on the growth of investment funds' assets, the growth of bank assets, real GDP growth of euro area trading partners, an indicator of market volatility (VIX), and the growth of EONIA as indicator of the monetary policy stance, all lagged by one quarter. In this econometric analysis, all explanatory variables besides the growth of banking sector assets, are exogenous to economic conditions in Luxembourg. We find that all explanatory variables, besides the growth of bank assets, are statistically and econometrically significant drivers of economic growth. We also experimented by replacing the growth of bank assets by the growth of cross-border bank assets (an indicator of

[11] The legal framework allows for temporary credit lines of up to 10 percent of assets.

[12] "Is the Financial Sector Luxembourg's Engine of Growth?" Paolo Guarda and Abdelaziz Rouabah, Cahier D'Etudes Working Paper No.97, July 2015, Banque Centrale du Luxembourg.

growth of the banking system that is exogenous to economic conditions in Luxembourg) and obtain similar results. This analysis suggests that the growth of the investment fund industry has significantly pulled the overall economic performance of Luxembourg as a financial center: according to our estimates, a one standard deviation (or 14 percentage points) increase in the growth of investment funds' assets lifted real GDP growth by about 1.4 percentage points (Table 2). A one percentage point increase in the real GDP growth of euro area trade partners impacted real GDP growth by between ⅔ of a percentage point and one percentage point. Monetary conditions in the euro area and global volatility of financial markets also impact real economic growth.

**Table 2. Dependent Variable: Real GDP Growth**

(Quarterly, y-o-y, SA)

| | (1) | (2) |
|---|---|---|
| Growth investment fund assets (-1) | 0.10 | 0.10 |
| | *2.09* | *2.63* |
| Growth bank assets (-1) | . | -0.14 |
| | | *-3.31* |
| Real GDP growth euro area (-1) | 0.67 | 0.99 |
| | *3.27* | *4.88* |
| Growth EONIA (-1) | -0.01 | -0.01 |
| | *-2.71* | *-2.99* |
| VIX (-1) | -0.001 | -0.001 |
| | *-2.95* | *-3.43* |
| Constant | 0.04 | 0.04 |
| | *2.71* | *2.97* |
| Obs | 58 | 58 |
| R2 | 0.68 | 0.7274 |

Note: *Robust t-stats in italics.*

**12. Global volatility is transmitted to Luxembourg's economy through the investment fund's sector (Table 3).** Quarterly changes in real GDP are correlated with net inflows in investment funds, suggesting that the high volatility of GDP is directly affected by the size of capital inflows in funds. In contrast, real GDP appears less affected by developments in cross-border liquidity operations of the banking system. This correlation between real GDP volatility and the volatility of investment funds' asset has increased since the Global Financial Crisis, from 0.27 to 0.73. Real GDP growth is somewhat less correlated with the volatility of bank's cross-border assets, but this correlation has also increased from 0.23 before the crisis to 0.51 since the Global Financial Crisis.

**Table 3. Correlation of Standard Deviation of Real GDP Quarterly Growth with:**

| | Financial GVA growth (std dev.) | IF asset growth (std dev.) | Bank cross-border asset growth (std dev.) |
|---|---|---|---|
| 2001Q1–2015Q2 | 0.60 | 0.59 | 0.23 |
| 2001Q1–2007Q4 | 0.49 | 0.27 | -0.39 |
| 2008Q1–2015Q2 | 0.64 | 0.73 | 0.51 |

Note: *Quarterly standard deviations computed over 4 quarters*

**Table 4. Fiscal Revenues from Financial Sector, 2014**

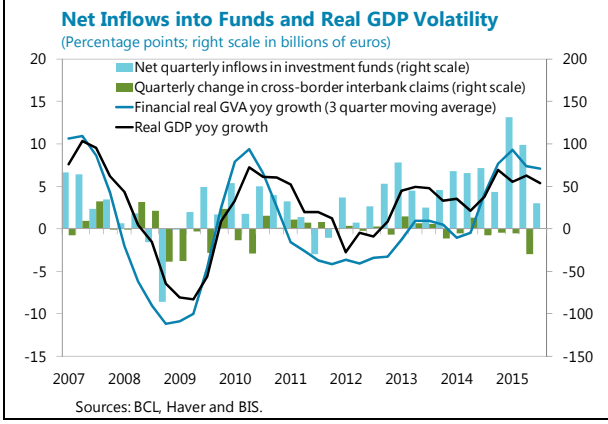
| | |
|---|---|
| In millions euros | 3,829 |
| In percent of GDP | 8 |
| *of which:* | |
| PIT | 958 |
| CIT | 1,767 |
| Subscription tax | 735 |
| Other | 369 |

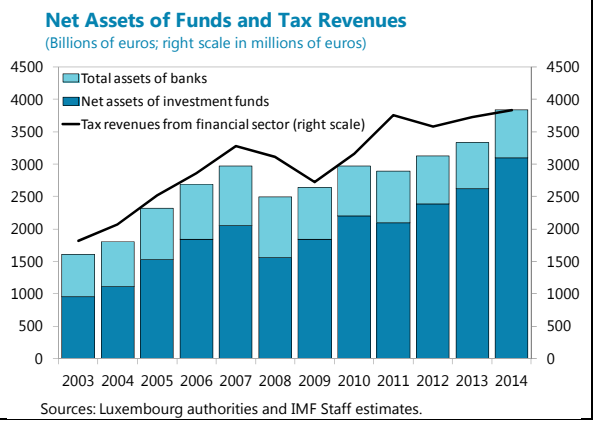
Sources: authorities and IMF staff estimates.

**13. The health of Luxembourg's financial sector directly impacts public finances (Table 4).** Fiscal revenues from the financial sector amounted to 8 percent of GDP in 2014, and about 18 percent of general government revenues. For the corporate income tax, almost 80 percent of the receipts or about 4 percent of GDP come from the financial sector. Banks account for the lion's share

of corporate income tax receipts, but asset managers and Soparfis (commercial entities benefiting from special tax regimes) also account for a significant share. Personal income tax of financial sector employees is also significant. The subscription tax of 1 to 5 basis points levied on the total value of investment funds' asset brings about 1½ percent of GDP annually. Other items include the net wealth tax, and taxes on goods and services. Since the early 2000s, the fiscal revenues from financial sector activity have grown in line with the value of investment funds' assets as proceeds from the subscription tax, and to some extent those from the corporate income tax, are directly related to them. Indeed, asset managers and banks providing services to investment funds, in particular custodian banks, charge a fee proportional to the volume of assets under management.

**Figure 7. Luxembourg Investment Funds: Macro-Financial Linkages**




## E. Conduit of Shocks

**14. Investment funds' asset growth is driven by global market and growth developments (Table 5).** We regress the quarterly growth of investment fund assets (y/y) on indicators of (i) global market conditions (the growth of the S&P500 index, and the growth of VIX); (ii) the growth of EONIA capturing the evolution of monetary conditions in the euro area and of search for yields; and (iii) world GDP growth, as an indicator of global income growth which may be correlated with the propensity to save. We find that all of the indicators are statistically and economically significantly correlated with the growth of investment funds' asset value. For instance, a one standard deviation increase in the growth of the S&P500 index (respectively in world GDP growth) is associated with a 4.9 percentage points (respectively 5.0 percentage points) increase in investment funds' asset growth, compared with an average quarterly growth of investment funds assets (y/y) of about 10 percentage points We next decompose the investment funds' asset growth into net inflows and valuation effects. We find that world GDP growth and the growth of the VIX, an indicator or market

**Table 5. Determinants of Investment Funds' Assets**

| Dependent Variables (growth of): | IF net assets | IF net inflows | Valuation effects |
|---|---|---|---|
| Growth of S&P 500 | 0.29*** | 0.13*** | 0.42*** |
| Growth of EONIA | -0.02** | -0.01* | -0.01* |
| Growth of VIX | -0.10*** | -0.06*** | -0.05* |
| World GDP growth | 2.82*** | 2.81*** | 0.01 |
| R2 | 0.64 | 0.60 | 0.67 |
| Obs | 59 | 59 | 59 |

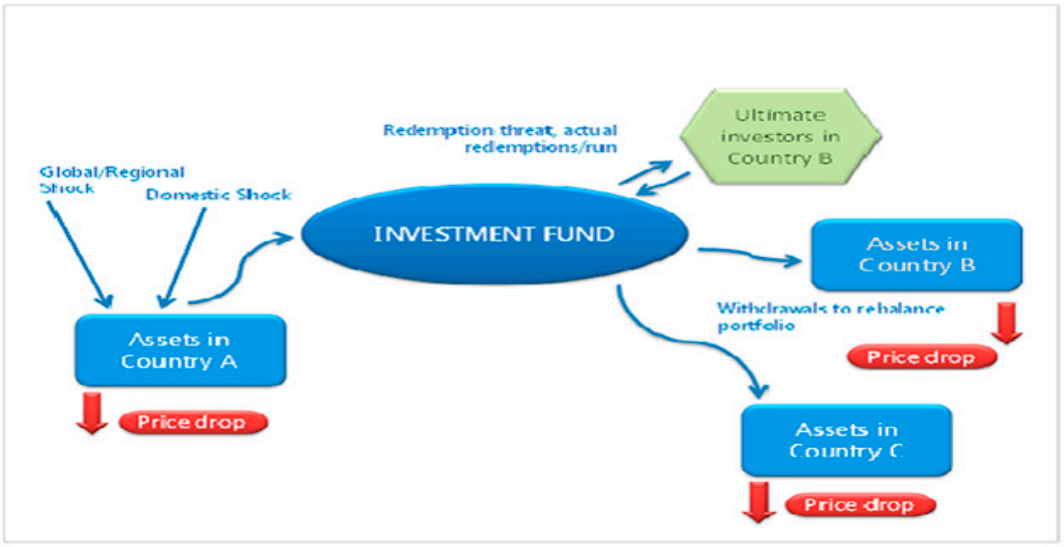
*Significance: *: 10 percent, **: 5 percent, ***: 1 percent*

volatility, are more important determinants of net inflows than of valuation effects, while the evolution of the US stock market is a more important driver of valuation effects than of net inflows.

**15. Investment funds can propagate shocks across countries and asset classes:**

- ***Framework.*** Investment funds act as common investors who may take correlated actions (Figure 8). They can propagate shocks by rebalancing their portfolio when relative performance concerns arise or when investors withdraw.[13] Due to constraints in their mandates, they may drop from their portfolio countries whose ratings are downgraded to below-investment grades. Herding behavior, to some extent the outcome of relative performance considerations and of an objective to protect the value of a portfolio, can generate correlated investment strategies across different funds. In particular, in time of stress, "wake-up" call effects when investors reassess the fundamentals of a country or asset class create correlated reactions and propagation of shocks among common investors going beyond what is warranted by the long-term value of the assets.[14]

**Figure 8. Propagation of Shocks through Investment Funds**




Source: IMF Staff.

- ***Sources of funds.*** There are no direct statistics on the geographical origin of investors because financial institutions initiating investment funds are not mandated to report the country of origin of the investors who purchase shares in these funds. However, the Coordinated Investment Portfolio Survey (CPIS) of the IMF provides an indirect way to identify the country of origin of these investors. Specifically, Table 8 of the CPIS shows the *derived* Portfolio Investment Liabilities

[13] Broner, Fernando A., R. Gaston Gelos and Carmen M. Reinhart. "When In Peril, Retrench: Testing The Portfolio Channel Of Contagion," Journal of International Economics, 2006, v69(1,Jun), 203-230

[14] Toni Ahnert and Christoph Bertsch, 2015. "A Wake-Up-Call Theory of Contagion," Staff Working Papers 15-14, Bank of Canada.

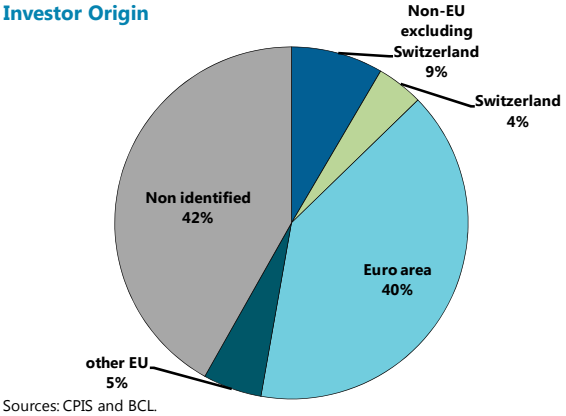
(equities and investment funds' shares) of Luxembourg. Combining the bilateral figures constructed from the position reported by creditor countries on Luxembourg's residents with the aggregate share liabilities reported in the balance sheets of investment funds provide an (incomplete) picture of the country of residence of investors.[15] According to the CPIS, 40 percent of investors are residents of euro area countries, 5 percent are residents from other EU countries, 9 percent from non-EU countries (excluding Switzerland) and 4 percent from Switzerland. The residual, 42 percent of the value of investment funds' shares, remain unidentified. In contrast, the country of origin of initiators is well identified because institutions must disclose their ownership structure and country of origin to the regulator at the time of authorization. The main countries of origin of investment funds' initiators, ranking by decreasing importance, are the U.S., the U.K., Switzerland, and euro area countries (Figure 9).

- ***Destination of funds.*** Luxembourg' investment funds are diversified by geography: their assets are allocated in the euro area (35 percent), the United States (26 percent), emerging markets (19 percent), the U.K. (8 percent), and other countries (18 percent). The overall top destination countries include the U.S., Italy, Germany, France, the U.K., the Netherlands and Japan. Large emerging markets such as India and China (each at €27 billion, 0.8 percent of assets) have captured an increasing share of equity investment and are now among the top 10 destination countries for equity investments (Figure 9).

**Figure 9. Luxembourg Investment Funds**

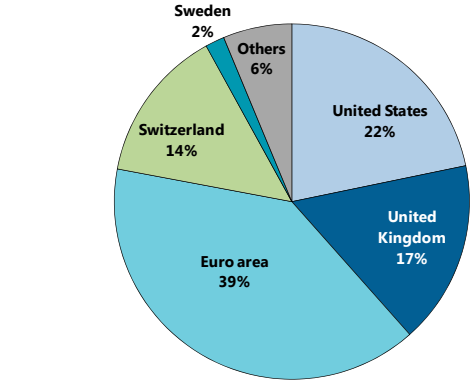
**Origin of Funds:**

**Investor Origin**



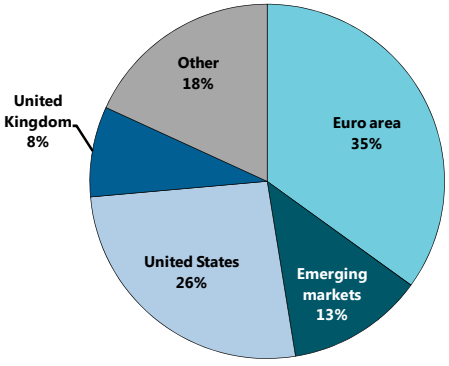

Sources: CPIS and BCL.

**UCITS: Initiator Origin, 2014**




**Destination of Funds:**

**IF Asset Allocation, Oct. 2015**




[15] The aggregate claims on investment funds from the CPIS is significantly lower than the aggregate shares obtained from investment funds' balance sheets, meaning that the difference accounts for shares in investment funds not reported in official statistics of investors' home countries.

- ***Asset classes.*** Luxembourg's non-monetary investment funds hold diversified classes of assets, but with a growing share of equities and corporate debt securities in their portfolio. At the end of October 2015, equities and fund's shares account for 45 percent of assets, non-financial private sector debt securities for 17.3 percent of assets, public sector debt securities for 14.3 percent of assets, financial derivatives and other claims for 10.5 percent of assets, bank debt securities for 6.4 percent of assets, and deposits for 6 percent of assets.[16]

**16. Bank-fund linkages would amplify the cross-border transmission of shocks through Luxembourg's funds (Table 6).** Shocks to Luxembourg's investment funds would be transmitted to the liabilities of domestic banks and to foreign banks via bond and stock holdings, derivative exposures, loans and deposits. Domestically, investment funds main claims on banks include deposits and derivative instruments. Abroad, investment funds have significant holdings of bank debt securities, but also of stocks, derivatives and deposits. Thus, shocks to investment funds could be transmitted abroad through the impact on these banks. The transmission to banks abroad would also be indirect: many Luxembourg based custodians operate under a centralized liquidity management framework located at parent level (i.e. fund deposits are placed by the Luxembourg entity with the parent company, while refinancing needs emanating from the Luxembourg entity are fulfilled by the parent company), a shock to their liabilities (derivatives or deposits) could be transmitted to the parent entity in charge of the global group-wide liquidity management. However, banks could also benefit from safe haven flows as retail investors shift savings from fund shares to deposits.

**Table 6. Exposures of Investment Funds to Banks in Luxembourg and to Banks Abroad**
(Billions of euros)

| | Banks in Luxembourg | Banks abroad |
|---|---|---|
| **Investment funds' assets** | 220 | 601 |
| *of which:* | | |
| Debt securities | 4 | 313 |
| Stocks | 0 | 98 |
| Derivatives | 72 | 97 |
| Deposits & loans | 144 | 92 |
| **Investment funds' liabilities** | 80 | 95 |
| *of which:* | | |
| Derivatives | 58 | 75 |

Source: BCL

Note: scope on the asset side: loans, equity instruments, debt instruments, derivatives; on the liability side: loans, short sales and derivatives

[16] Some funds buy shares from other (more specialized) funds.

## F. Scenario Analysis

**17. We consider a scenario of severe stress with the following characteristics:**

- *Shock.* The shock would originate in one or several countries (such as emerging markets) or asset classes (such as high yield corporate bonds or securities of banks) where valuations would be reassessed by investors to be excessively rich and significantly misaligned with fundamentals. Concerns of market risk, credit risks or liquidity risks, which could all be related, would be observed in rising spreads relative to safe haven government bonds, and rising indicators of market volatility such as the VIX. These events would trigger sudden redemptions from investors and fire sales by asset managers to meet redemption requests and protect the value of the funds.

- *Redemptions would be large and sudden.* The high asset valuations, the large cash pools of corporations invested in recent years and first-mover advantages increase the likelihood of sudden runs on investment funds. Asset managers would decide to use the available liquidity management tools, which include suspension of redemptions and gates, depending on the size and duration of the redemption shock.

- *Asset sell-off.* To protect the value of funds, asset managers would first sell the assets under stress, subject to some investment restrictions. This would aggravate the market impact. The search for yield has increased exposures to less liquid assets (such as high yield corporate bonds) which may experience sharp price decline in a sell-off. Liquid assets (such as bank deposits) could initially increase and be substituted in the portfolios of investment funds for precautionary reasons. They would begin to decline to meet redemptions requests if the latter are sustained over time.

- *Asset price correlations would make the shock global.* Asset prices have been increasingly moving in unison, and fire sales affecting one market or asset classes could easily spread to other countries or assets (Global Financial Stability Report, chapter one, October 2015). The assets most vulnerable to price contagion include emerging market bonds and US high yield bonds, two asset classes to which exposures have risen in recent years.

- *Use of complex financial instruments could have unexpected effects on funds and interconnections.* The use of derivative leverage could increase sensitivity to interest rate movements and amplify the impact of sudden redemption on asset prices and on the value of funds. Derivative contracts and securities lending, with banks and insurance companies as counterparties, may be severely impacted by disruptions in asset markets and the need to accommodate large redemptions.

- *Benefits of diversification would dwindle.* If the shock progressively becomes global and severe as during the Global Financial Crisis, returns of diverse funds would obey a common factor, and their asset managers would take correlated actions across countries and asset classes.

**18. Calibration of the shock.** We apply the maximum monthly redemption during October2008 and the maximum 3 months cumulative redemption of September-November 2008 in percent of net

asset value to the October 2015 aggregate net asset value of Luxembourg's investment funds (Box 1 describes episodes of severe financial stress that have occurred since 2008). The shock by asset classes is constructed by using the net inflows by asset class reported in the financial accounts of Luxembourg for the last quarter of 2008. Combining the current country allocation for equity and bonds and the redemptions estimated by asset classes, we are able to construct a scenario of redemption shocks by asset classes and by country. Because of safe haven flows, allocation in specific government bonds (such as US or core euro area) could increase, while redemptions from financial bonds or corporate bonds could be larger. We construct two scenarios: (i) in a first scenario, all bonds experience net redemptions; (ii) in a second scenario, government bonds of the US, Germany, France, the Netherlands, the UK and Japan experience no net redemptions, and the aggregate bond redemptions are kept consistent with historical net redemptions by proportionally increasing redemptions from other bond classes (bank, corporate) and bonds from other countries. While the top-down scenario analysis provides an order of magnitude of outflows and valuation effects from asset markets, more detailed analysis at a fund level should also consider the potential disruptions and shock transmission that could arise as a result of the use of derivative leverage, securities lending, liquidity mismatches between assets and redemption terms.

### Box 1. Using Events of Severe Stress to Calibrate the Shock

The Global Financial Crisis of 2008–09, the severe volatility of 2011 and the bout of volatility in 2015 and January 2016 offer some indications on how shocks could propagate and impact investment funds. In particular, as shocks become more global and severe, net outflows play a growing role in the aggregate decline in the value of the funds:

- Between September and December 2008, the net asset value of all Luxembourg non-monetary investment funds declined by 18.7 percent (or €358 billion), of which 6.0 percent of aggregate net redemptions and 12.7 percent of valuation effects. According to data provided by the BCL, their deposits in Luxembourg banks declined by €6.6 billion in 2008:Q4 and by another €5 billion in 2009:Q1. Since the global financial crisis, Luxembourg's investment funds have staged a strong recovery suggesting that the product was robust to severe shocks.
- Between June and December 2011, the net value of investment funds declined by 5.5 percent (or €122 billion), of which 2.0 percent of aggregate net redemptions and 3.5 percent of decline in the value of funds.
- The August-September 2015 event of volatility caused a 6.0 percent (€216.3 billion) decline in the aggregate value of funds, of which 6.3 percent of valuation effect (€224.3 billion) which was moderately offset by a 0.3 percent (€8.3 billion) aggregate net inflow (down from a €28 billion monthly average of net inflows in the year to July 2015).
- In January 2016 alone, Luxembourg's investment funds net assets declined by 3.9 percent (€135 billion), with net redemptions of €20 billion, and market valuation effects of €115 billion.

While idiosyncratic shocks (e.g. suspension of redemptions and activation of gates) have been observed during these episodes, the redemption pressures thus far have been manageable.

**19. Results.** Because the aggregate value of investment funds has almost doubled since September 2008, a redemption shock calibrated from the redemptions in percent of net assets of September 2008 would have a larger absolute impact on Luxembourg and global markets.

- *Aggregate impact (Table 7).* The one month shock is calibrated to result in an overall decline in the value of assets of 8.3 percent, combining aggregate net redemptions of 3.8 percent and a market effect of 4.5 percent. Applied to the October 2015 net assets of investment funds, this would be equivalent to an overall decline of almost €300 billion. The cumulative shock over 3 consecutive months would reach €475 billion, with €191 billion of net redemptions and €284 billion of valuation effects. Recent market movements in 2015 and early 2016 suggest that, while such valuation effects do, in fact, materialize in periods of market stress (and not only during tail risk events), large net aggregate redemptions are less common.

**Table 7. Effects of Shocks**

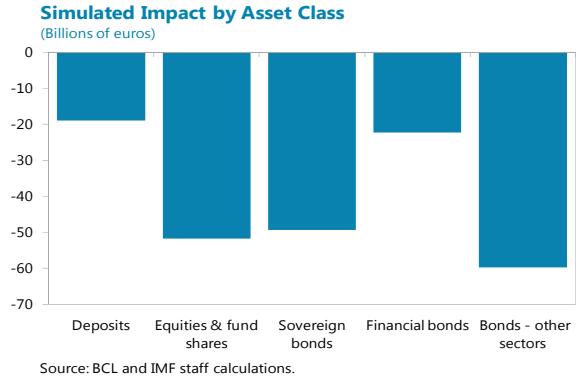
| **Historical Shock, October 2008:** | | |
|---|---|---|
| (Billions of euros unless otherwise indicated) | One month | Cumulative 3 months |
| Aggregate net redemption | -69 | -104 |
| *in percent of net assets* | *-3.8%* | *-5.4%* |
| Valuation effect | -81 | -155 |
| *in percent of net assets* | *-4.5%* | *-8.1%* |
| **Applied to net asset value (10/2015) :** | | **3513.4** |
| (Billions of euros) | | |
| Redemption shock | -135 | -191 |
| Valuation effect | -158 | -284 |
| Total | -293 | -475 |

Sources: BCL and IMF staff estimates.

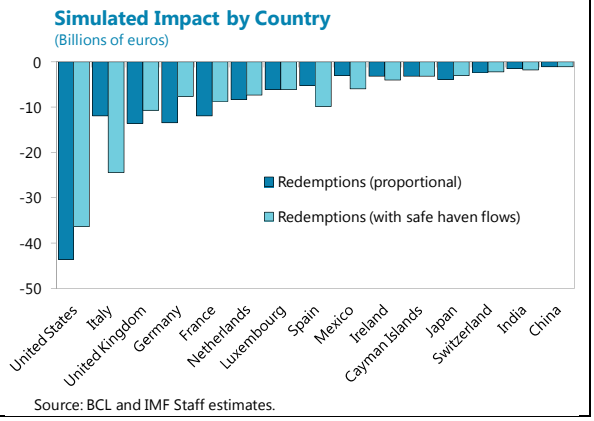
- *Impact by asset classes and country (Figure 10).* Making use of the information in the financial accounts of Luxembourg on the net flows for specific asset classes during the global financial crisis, we are able to apply the scenario of shocks cumulative over 3 months to the October 2015 portfolio of investment funds to estimate net outflows by asset classes and by country. We find that corporate and bank bonds, bank deposits, equities, and to some extent sovereign bonds would be the most affected by the net redemptions. Turning to country allocation, the US, Italy, the U.K., Germany, France and Spain would the countries the most affected by the shock. India, China, the Cayman Islands (itself a conduit of shock rather than a destination), and Japan would also experience financial spillovers. If safe haven flows are taken into account, the US, Germany, France or the U.K. would for instance be less affected while Italy and Spain would be more affected.

- *Impact on the real economy.* We estimate the direct impact of the decline in investment funds during the global financial crisis on real GDP growth, based on the empirical analysis reported in section D. According to our estimates, at the end of 2008:Q4, the value of investment funds' asset was about ¼ lower than a year earlier—implying a decline in real quarterly GDP growth of 2.5 percentage points in 2008:Q4, or about 40 percent of the actual 6.5 percentage points decline of real quarterly GDP growth.

**Figure 10. Luxembourg Investment Funds: Impact of Shock**




Source: BCL and IMF staff calculations.




Source: BCL and IMF Staff estimates.

**20. Cross linkages between investment funds and banks would amplify the impact of severe shocks:**

i. Investments' funds large cash balances could over time be withdrawn from Luxembourg's depository system to meet redemption needs. These deposits are large relative to the size of the banking system and are concentrated in depository banks, at about 50 percent of these banks' liabilities. Temporary mitigation of redemption needs would be provided by the tools of liquidity managements available to the asset manager.

ii. Banks provide substantial (non-financial) services, such as depository services, pricing, brokerage, accounting, and have clients common with asset managers. During severe market volatility, direct connections between the asset managers, related banks or insurance companies would create further scope for contagion, including through reputational effects;

iii. Investors bear the risks of investment funds. However, during a tail risk event, the parent bank of an asset manager might be compelled to provide temporary liquidity lines out of reputational concerns, even if investment funds' balance sheets are legally separated from the asset manager;

iv. Banks, as well as insurance companies, also serve as counterparties for various types of derivative and other contracts held by investment funds. In a tail event, these contracts may be severely impacted by a disruption in asset markets and the need to accommodate large redemptions.

**21. Policies should evolve and prepare for the contingency of a large shock.** A severe shock would be larger than in the past given the aggregate size of funds, and potentially more complex to handle given the use of intricate derivative contracts, securities lending activities, and potential liquidity mismatches between funds' assets and redemption terms:

- Adequate resources should be allocated to the oversight to ensure that sound risk management practices, prudential norms or rules governing liquidity, leverage, redemptions and asset valuation are in place at the fund and at the asset manager levels.

- Data monitoring should allow detecting early warning signs of realization of market risks, credit risks or liquidity risks and possible shocks.
- Data monitoring should allow identifying funds' sensitivity to interest rates and credit market movements. The use of derivatives that could boost yields and leverage, securities lending and liquidity mismatches between assets and redemption terms should be more specifically scrutinized, especially given the increased use of derivative leverage by several Luxembourg's bond funds in recent years.
- The CSSF should evaluate investment funds' resilience under various stress test shock scenarios. Risks should be assessed not only at the investment fund level but also from a financial stability perspective, allowing for correlated shocks across funds and for large portfolio reallocations between funds and significant net redemptions.
- The toolkit of liquidity risk management of investment funds by asset managers and regulators—comprises redemption fees, gates, side pockets or suspension of redemptions—should be tested in the context of severe stress scenarios and should continue to evolve.
- Joint scenario analysis between banks and investment funds, including liquidity stress tests, are important. The large exposures to corporate bonds could turn illiquid and cause sharp movements in fund value, with indirect effects on banks' income, while changes in direct exposures to banks could affect banks' liquidity position and funding.
- As redemptions could affect banks in Luxembourg and abroad, the authorities should advocate further financial stability analysis of these linkages in the SSM and include them in the design of joint fund-bank stress test scenarios, including for asset managers who are owned by systemic banks.
- To mitigate the impact of potential shocks on the bank system, banks should be compliant with the local LCR with good collateral, while the ECB should stand ready to provide liquidity to banks if a shock materializes.

## G. Conclusion

**22. Risks in the investment fund industry have grown in recent years, globally but also in Luxembourg.** The fast growing investment funds, which have benefited from QE and a search for yield, comprise diverse asset classes across many countries. The use of securities lending and of derivative leverage, liquidity mismatches between assets and redemption terms, and links to banks have raised awareness of risks and may exacerbate financial stress.

**23. Linkages between banks and investment funds are an important trait of the financial system.** Depository banks of investment funds are all located in Luxembourg and banks provide administrative, custodian, pricing, brokerage, and accounting services to funds. Investment funds hold sizable deposits in their depository banks, which often channel the liquidity to the parent. They hold significant amounts of financial bonds and equities of non domestic issuers while banks act as

counterparties in derivative contracts. There are also ownership links between Luxembourg fund management companies and large international banking groups.

**24. These bank-fund linkages reinforce macro-financial linkages in Luxembourg and how Luxembourg transmits shocks internationally**. Real GDP fluctuates with global market developments through the impact on investment funds' net inflows and valuation effects. Tax revenues are directly impacted by the performance of the investment funds, their asset managers, and their depository banks. Investment funds have diverse exposures to global markets and to banks abroad. In severe volatility scenarios involving significant turbulence in emerging markets or other asset classes that prompt investor withdrawals, investment funds' cash balances could to some extent be withdrawn from Luxembourg's banking system to meet redemption needs, and bank equities and bonds could experience fire sales. Redemptions can be sudden and large, especially as asset prices have increasingly moved in unison, discounting the benefits of portfolio diversification.

**25. It is thus important that oversight of investment funds and asset managers evolves in line with international standards and practices.** While the relevant EU directives have strengthened the risk monitoring, risk management and supervisory framework, the use of derivatives that boost leverage, liquidity mismatches between assets and redemption terms, and the use of securities lending to improve cash returns should be more specifically scrutinized. The data reporting should allow identifying funds' sensitivity to interest rates and credit market movements and detecting early warning signs of possible shocks.

**26. Risk monitoring and regulatory frameworks should take into account and further investigate the linkages between banks and investment funds.** Risks should be assessed not only at the investment fund level but also from a financial stability perspective. Joint scenario analysis and liquidity stress tests would be particularly useful, especially as the large exposures to corporate bonds could turn illiquid and cause sharp movements in fund value, with indirect effects on banks. Given the cross-border dimension, this analysis should take place also at the SSM level.

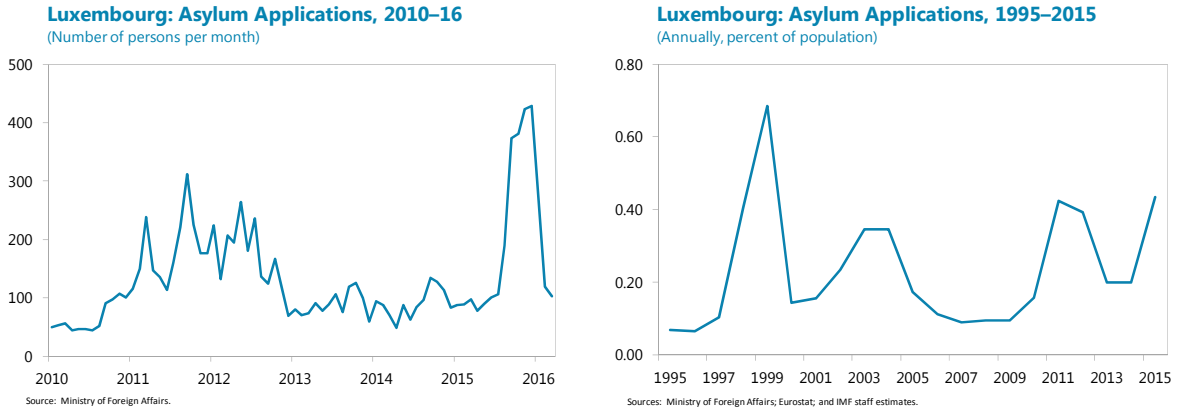
# LESSONS AND CHALLENGES IN ACCOMMODATING MIGRANTS AND REFUGEES[1]

*Past experience of handling migration flows and a positive public attitude have helped the authorities to mobilize resources for accommodating sharply rising refugee inflows from mid-2015. Economic migrants coming to the country in the past, mostly from other EU member states, had generally higher education than locals. When controlling for education and other relevant factors, past migrants earn less than natives for similar work, which might in part explain their success in claiming local jobs. Early evidence suggests that refugees that arrived in the country in the second half of 2015 have generally lower education attainment compared to past economic migrants. Further reforms are required to address structural unemployment and facilitate integration of low-skilled refugees in the labor force.*

## A. Coping with the Current Refugee Influx

**1. The refugee influx into Luxembourg surged in the second half of 2015.** Starting from September, asylum applications increased by about three times from last year and surpassed the previous monthly peaks of 2011–12. Actual refugee arrivals recorded at the border were even higher, as it took time for the newcomers to apply for asylum and some of them chose to proceed to neighboring countries. Although asylum applications subsided in early 2016, tensions in the Middle East, spillovers from neighboring Germany, family reunifications, and the EU relocation program could sustain elevated refugee inflows in the rest of the year.

**Figure 1. Asylum Applications**




**2. This is not the first time that Luxembourg is faced with a refugee influx.** On the annual basis, asylum applications measured about 0.4 percent of population in 2015, slightly above the

[1] Prepared by Michael Gorbanyov.

previous peak in 2011. However, they fell short of the record high 0.7 percent of population in 1999, which largely reflected refugees fleeing from armed conflicts in the former Yugoslavia. Over the years, refugees accounted for a significant share of net migration into Luxembourg, which increased from about 1 percent of population in the 1990s to about 2 percent in 2011–15.

**3. The authorities responded by scaling up capacities for accommodating refugees.** Incoming refugees were housed in empty public buildings and newly constructed "container villages". Since the beginning of the crisis, Luxembourg doubled its capacity to accommodate refugees to about 4,000 people, and as of March 2016, the country housed about 3,000 of them (about ½ percent of its population). Drawing on past experience, the authorities considered that families with children are easier to integrate over time. All newcomers are enrolled in schools and language classes. To tackle the influx of pupils, the authorities issued a successful call to retired teachers to return to part-time work. To facilitate diploma recognition, they are eyeing the German example of holding focused interviews of refugees with professionals in their selected field of expertise.

**4. Luxembourg's society has generally a positive attitude to refugees and supports government efforts to accommodate them.** According to a public opinion survey taken in November 2015, nearly half of respondents said that Luxembourg must continue to accommodate refugees in coming months. And nearly two-thirds of the respondents agreed that refugees are "people like us".[2]

## B. The Immediate Fiscal Costs and Long-term Gains

**5. The immediate fiscal costs of accommodating refugees are significant but manageable.** IMF Staff Discussion Note on the refugee surge in Europe estimated the costs at around 0.1 percent of GDP in 2015 and projected the same amount for 2016.[3] Broadly consistent with these numbers, the *Banque Centrale du Luxembourg* (BCL) estimated extra fiscal costs at 0.15–0.20 percent of GDP over 2015–16.[4] In case of sustained elevated refugee arrivals, however, fiscal spending in 2016 could exceed these estimates, on account of additional education, security, social assistance, public infrastructure needs and other costs. At the same time, the extra spending is bearable for Luxembourg whose fiscal surplus is projected at nearly 1 percent of GDP in 2016.

**6. Past positive experience suggests that Luxembourg could, under the right circumstances, benefit from the current refugee surge in the long run.** According to an OECD study, the positive net fiscal impact of immigration—encompassing both economic migration and refugees—for Luxembourg averaged about 2 percent of GDP in 2007–09, the highest among OECD

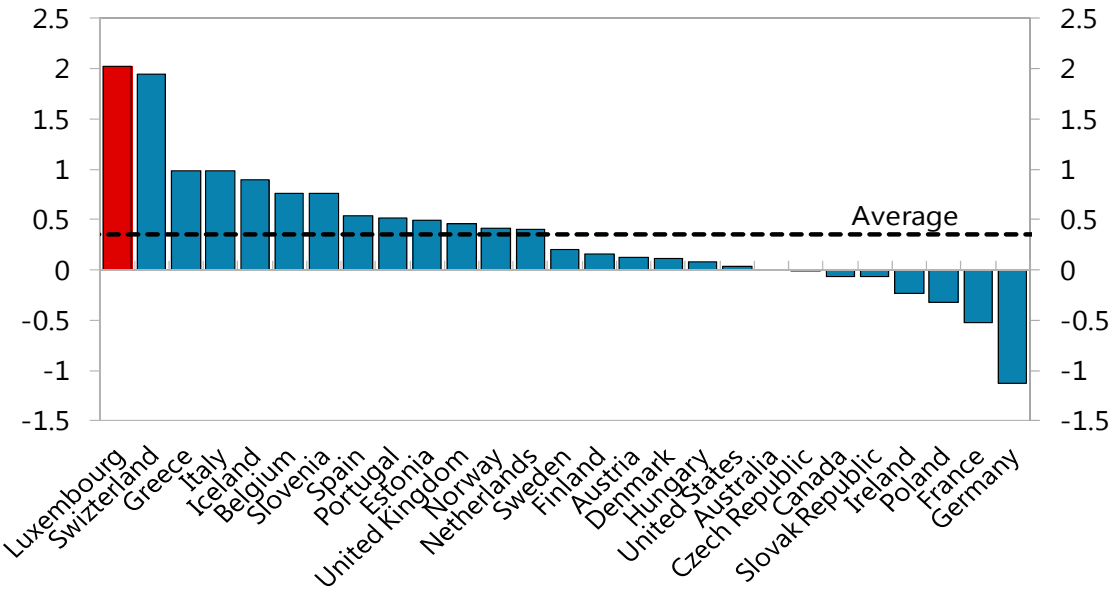
[2] Autumn 2015 Politmonitor survey of 1,020 people aged 18 and over.

[3] "The Refugee Surge in Europe: Economic Challenges,"—IMF Staff Discussion Notes No. 16/2—January 20, 2016.

[4] "Bulletin BCL 2015/3."—BCL, December 2015.

countries (Figure 2 and Box 1).[5] While the characteristics of the current inflow of refugees differ from those of past migration to Luxembourg—just as past migratory phenomena are not comparable among themselves (Box 2)—certain parallels do exist and point to potential benefits for the Luxembourg economy. In particular, the incoming refugees are generally younger and have higher fertility rates than Luxembourg natives. In case of a successful integration in the Luxembourg labor market and society, they could be expected to make broadly positive net fiscal contribution in the long term, particularly through their inclusion in the pension system.

**Figure 2. Estimated Net Fiscal Impact of Immigrants, 2007–09**
(Percent of GDP, average over the period)




Source: OECD, International Migration Outlook, 2013

### Box 1. Net Fiscal Impact of Immigration

Measuring the fiscal impact of immigration is a challenging task, and any estimate of the budget implications is largely dependent on the measurement approach and the assumptions made.

The most straightforward items to include in an assessment of the budget implications of migration are the direct financial transfers involving immigrants, that is, the taxes and social security contributions paid and the financial transfers received via unemployment and social assistance benefits, disability payments, family allowances, financial housing support, and the like. Specific issues arise with the pension system, where the time-lag between contributions and benefit payments is particularly long. Given the magnitude of the sums involved, inclusion or exclusion of the pension system can considerably alter the balance, as immigrants are largely underrepresented among the elderly in most countries, especially in countries where a large share of immigrants arrived only recently.

[5] "International Migration Outlook 2013"—OECD, June 2013.

### Box 1. Net Fiscal Impact of Immigration (Concluded)

Direct fiscal transfers are not the only component that should be considered in assessing the fiscal impact of immigration. First, one should take account of the indirect taxes and consumption of social goods such as education and health by immigrants. Second, one should also consider public goods, some of which may partly depend upon the size and composition of the population. Finally, there are indirect budget implications arising from migrant's broader impact on the economy.

Source: "International Migration Outlook 2013."—OECD, June 2013, pages 130–131.

### Box 2. Migrants, Cross-Border Workers, and Refugees

When analyzing Luxembourg's labor market and migration phenomena, it is important to distinguish between the main actor groups.

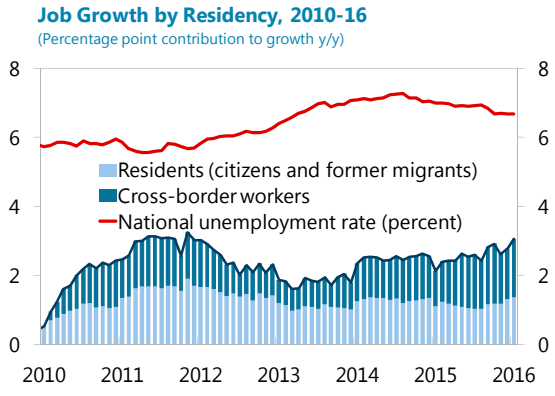
- In this paper, we use the word "migrants" for people of non-Luxembourg origin who migrated to the country in the past and have settled in it. Most of them came to Luxembourg for economic reasons. They include intra-EU migration, which reflects internal EU labor market mobility.
- We use the term "cross-border workers" for people who live in the neighboring countries (Germany, France, and Belgium) and commute to Luxembourg for work on a regular basis.
- Finally, we reserve the term "refugees" for asylum seekers who come to Luxembourg driven by safety considerations and normally originate from countries outside the EU.

## C. Performance of Past Migrants in Luxembourg's Economy

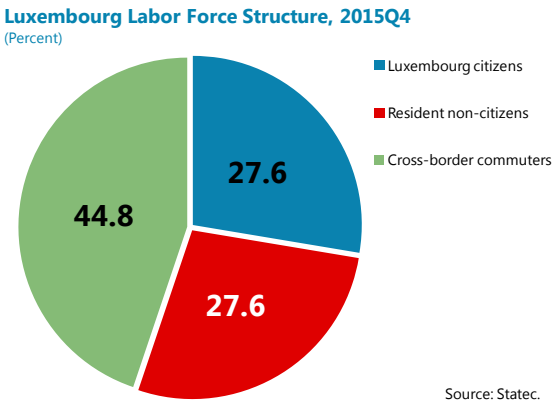
**7. Migrants and cross-border workers are filling a large share of newly created jobs.**

In 2015, Luxembourg's citizens accounted for only 28 percent of employment. Foreign citizens living and working in the country took about 27 percent of the jobs. The rest, as much as 45 percent of employment, were cross-border workers living in neighboring countries and commuting to Luxembourg for work.

**Figure 3. Job Growth and Labor Force Structure**



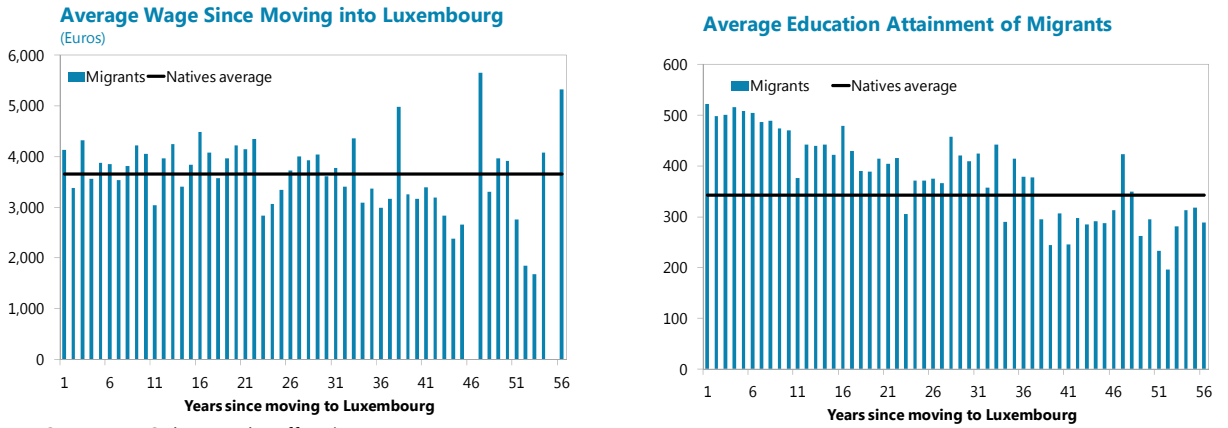

Sources: DataInsight, Haver Analytics, and IMF staff estimates.




Source: Statec.

**8. On average, economic migrants who came to Luxembourg in the past have a higher educational attainment than natives while being paid about the same, which might in part explain their success in claiming local jobs.** According to Luxembourg's Labor Force Survey (LFS), migrants earn about the same average wage as natives. However, the educational attainment of migrants arriving during the past 35 years is significantly higher, pointing to their higher professional qualifications and skills. When controlling for education, job type and status, age, and other factors, regression analysis confirms that migrants are paid less than locals for the same jobs. The difference is about 6 percent on average and is particularly significant for newcomers, who in their first 8 years in the country earn about 11 percent less than natives (Annex I).

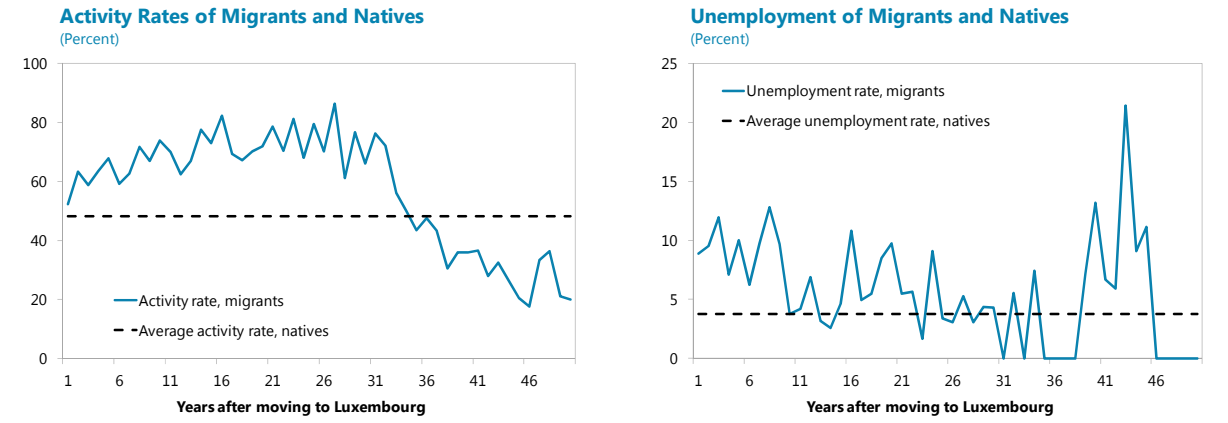
**Figure 4. Average Wage and Educational Attainment**




Sources: LFS data; and staff estimates.

**9. Alongside, economic migrants are more active in their job search.** The activity rates among migrants who arrived in Luxembourg over the past 30 years vary from 52 to 86 percent, which is significantly above the average for the native population (48 percent). At the same time, the estimated unemployment rate among migrants is also higher, particularly in their first years in the country. It is also higher for older migrants who stayed in the country for more than 35 years and are retiring out of the labor force. For them, however, the below average activity and higher unemployment rate reflect their senior age rather than their migration status.

**Figure 5. Activity and Unemployment Rate**




Sources: LFS data; and staff estimates.

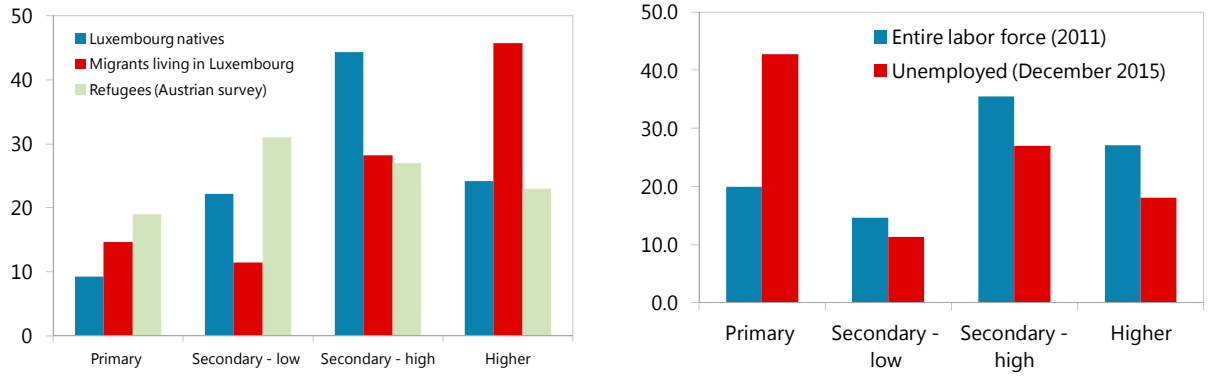
## D. Comparing the Incoming Refugees with the Past Migrants Living in Luxembourg

**10. Surveys of refugees taken in the neighboring countries indicate that their education attainment is below that of the past economic migrants and of Luxembourg's population.** According to an Austrian survey of about 900 asylum seekers who recently arrived in that country, nearly a quarter of them have higher (tertiary) education and only 1/5 of them did not complete secondary school.[6] However, the share of people with low education level is higher among refugees from the conflict countries. According to a Germany survey of refugees from Syria, Afghanistan, Eritrea, Iraq, Iran, Sri Lanka undertaken back in 2014, about 37 percent of refugees from those six countries did not complete secondary school, of which 7 percent never attended school at all.[7] These surveys suggest that the educational level of asylum seekers who recently arrived in Luxembourg is likely below that of Luxembourg citizens and economic migrants that came to the country in the past.

**11. Moreover, language barriers, diploma recognition and other disadvantages make it difficult for the refugees to realize the full potential of their educational background.** Refugees arriving from the Middle East appear to mostly not speak European languages and need to learn them in their host countries. Verification of their diplomas and other documents is a challenge, and their professional qualifications do not always match the technical requirements and standards of European host countries. In practice, this means that refugees often enroll in the labor market at a professional level well below their stated qualifications.

**Figure 6. Education Attainment**

(Percent)




Sources: Statec; and Austrian Public Employment Service.

[6] "Kompetenzcheck-Ergebnisse: Personen aus Syrien, dem Iran und Irak sind am besten qualifiziert."—Pressekonferenz—Asylberechtigte auf Jobsuche, January 2016.

[7] "Asylberechtigte und anerkannte Flüchtlinge in Deutschland. Qualifikationsstruktur, Arbeitsmarktbeteiligung und Zukunftsorientierungen."—BAMF-Kurzanalyse, January 2016.

**12. The incoming refugees can add to the pool of low-qualified labor competing for the limited number of low-skill local jobs.** Over 40 percent of Luxembourg's unemployed have only primary education. These people are struggling to find employment in the sophisticated Luxembourgish economy that creates more jobs requiring advanced academic degrees and professional qualifications. They are competing with cross-border workers and are often deterred by "inactivity traps" created by the generous welfare system that blunts their incentives for proactive job search and re-training.[8]

## E. Facilitating Employment of Refugees and Long-term Unemployed

**13. Challenges of enrolling refugees in the labor market may call for extending to them the available promotion programs, including those designed for the long-term unemployed.** By the time asylum seekers reach their new host countries after a long and perilous journey and get through the asylum application process to job authorization, they have often had been out of a permanent legal job for more than a year. This can be roughly estimated by adding the travel time (at least 2–3 months), the time from the asylum application to the job authorization (recently cut from 9 to 6 months in Luxembourg), and the stay in refugee camps after leaving their home countries. Their educational and professional characteristics resemble those for the long-term unemployed, which calls for special efforts for their labor market integration. As creating special employment regimes for refugees can undermine social cohesion, enrolling them in pre-existing programs available to local unemployed should be more acceptable.

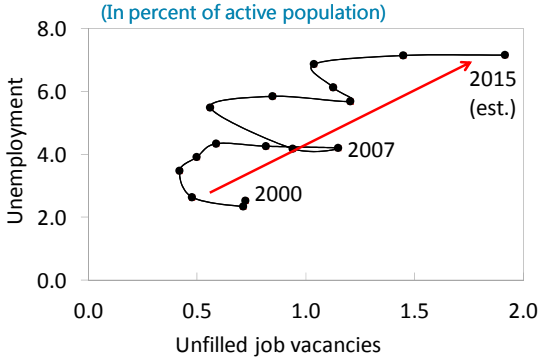
**14. Employment promotion programs administered by the Luxembourg's public employment service (ADEM) could be extended to refugees.** ADEM emphasizes a personal approach to the needs of job seekers. Its menu of options for the long-term unemployed includes apprenticeship and learning-through-doing programs, subsidized temporary employment, and re-training courses. In addition, ADEM promotes special programs for the young (including the "Youth Guarantee Scheme") and people with partial disabilities and medical pre-conditions. These programs, in combination with the robust economic growth, have set Luxembourg's unemployment rate on a declining path in 2015.

[8] See "Addressing Disincentives to Work" in the Selected Issues for the 2014 Article IV Consultation, pages 14–17.

**15. Further labor market reforms could help address the root causes of structural unemployment and facilitate insertion of refugees in the labor market.** As highlighted in the IMF Staff Discussion Note on the refugee surge in Europe, a high statutory minimum wage may prevent hiring of low-skilled workers, who are overrepresented among refugees. This may justify granting temporary and limited exceptions from the minimum wage for both refugees and the long-term unemployed, including through wage subsidies. Removal of barriers to employment and increasing flexibility of hiring and firing decisions for firms would help as well. The unemployment benefits could be modified to increase digressivity for the long-term unemployed and encourage acceptance of available vacancies so as to break "inactivity traps" and motivate proactive job search. In addition, Luxembourg can consider further reducing below 6 months the time between the asylum application and the work permit granted to refugees, which would allow them to work while their application is being considered. Moreover, re-training programs should focus on equipping the long-term unemployed and refugees with the skills most in demand in the economy to address skills mismatches manifested in rising number of available vacancies along with the increasing unemployment rate over the last 15 years.

**Figure 7. Beveridge Curve, 2000–2015**

(In percent of active population)




Source: Statec.

# Annex I. Regression Analysis of Labor Force Survey Data

**Data coverage and limitations.** The database of Luxembourg's Labor Force Survey (LFS) for 2014 contains nearly 14,000 individual responses to the survey questions.[1] LFS data cover residents—Luxembourg natives and former migrants living in the country, but does not cover cross border workers. For the purposes of this study, we identify as "natives" all LFS respondents who live in Luxembourg since birth (though some of them have foreign citizenship), and as "migrants" all the respondents who moved to Luxembourg at some point in the past (though some of them have since acquired Luxembourg citizenship).

Out of the LFS database for 2014, about 5,000 responses include specific numerical information on the earnings of the respondents that we can use in regression analysis (variable WAGE). Out of several dozen survey questions, we selected those that matter most for earnings. These include education attainment (HATLEVEL), migrant or citizen status (YEARESIDX dummy), full/part time (FTPT) or temporary/permanent (TEMP) status of the job, whether it involves supervisory responsibilities (SUPVISOR), age of the respondent (dummies AGECLASS3, AGECLASS4, and AGECLASS5 for various age groups), and job classification (ISCO4D).

**Regression.** We regress the wage on the set of explanatory variables in an ordinary least squares regression. All selected variables are highly significant at a confidence level of 0.2 percent or better.

**Table 1. Ordinary Least Squares Regression**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| HATLEVEL | 3.34 | 0.17 | 19.66 | 0.00 |
| YEARESIDX | -229.40 | 66.89 | -3.43 | 0.00 |
| FTPT | 1396.50 | 70.27 | 19.87 | 0.00 |
| TEMP | 806.86 | 108.03 | 7.47 | 0.00 |
| SUPVISOR | 907.83 | 64.32 | 14.11 | 0.00 |
| AGECLASS3 | 722.00 | 126.10 | 5.73 | 0.00 |
| AGECLASS4 | 1570.16 | 130.71 | 12.01 | 0.00 |
| AGECLASS5 | 1131.37 | 360.54 | 3.14 | 0.00 |
| ISCO4D | -17.24 | 1.36 | -12.71 | 0.00 |
| | | | | |
| R-squared | 0.34 | Mean dependent var | | 3713.95 |
| Adjusted R-squared | 0.34 | S.D. dependent var | | 2499.29 |
| S.E. of regression | 2025.06 | Akaike info criterion | | 18.07 |
| Sum squared resid | 2.04E+10 | Schwarz criterion | | 18.08 |
| Log likelihood | -45003.42 | Hannan-Quinn criter. | | 18.07 |
| Durbin-Watson stat | 1.95 | | | |

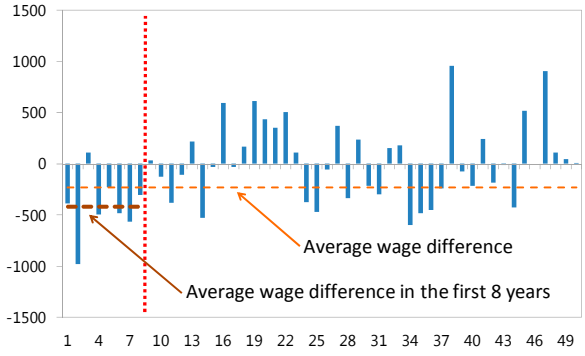
**Results.** The coefficient for the YEARESIDX dummy for native/migrant status indicates that for migrants, the average monthly wage is about €229.4 less than for natives. As the average wage for native citizens in the LFS survey sample is about €3,716.2, one can calculate that migrants earn, on average, about 6.2 percent less than natives when all explanatory factors are accounted for.

[1] The author thanks Marco Schockmel from the Luxembourg's Central Service for Statistics and Economic Studies (Statec) for providing the data.

Furthermore, we can calculate the residual between the actual wage and the one implied by the regression for each individual using all regressions variables except the native/migrant dummy. Next, we can compare this residual with other information for each individual. In particular, this allows us to deduce the wage differentials depending on how long the migrants have stayed in the country. It turned out that this difference is highest, about 11.3 percent on average, in the first 8 years after migration.

**Figure 1. Wage Difference Between Natives and Migrants**

(Euros)




Our results are consistent with findings reported in the literature. For example, a recent IMF study for neighboring Germany found that new migrants earn about 20 percent less than natives in their first year in the country. This difference narrows down gradually as the migrants settle in and dissipates over 20 years after arrival.[2]

Finally, we can study the wage differences across sectors of economy. The negative wage difference is highest in the real estate, accommodation, food services, and other services sectors. On the other side of the spectrum, migrants earn much more than natives in the financial sector, public administration, utilities, and in extraterritorial organizations.

**Table 2. Wage Differences Between Native and Migrants Across Sectors**

(Euros)

| | |
|---|---|
| Real estate activities | -999.8 |
| Accommodation and food service activities | -959.3 |
| Other service activities | -784.0 |
| Mining and quarrying | -671.5 |
| Arts, entertainment and recreation | -654.4 |
| Wholesale and retail trade; repair of motor vehicles and motorcycles | -569.0 |
| Professional, scientific and technical activities | -486.0 |
| Water supply; sewerage, waste management and remediation activities | -421.3 |
| Construction | -382.9 |
| Administrative and support service activities | -333.3 |
| Information and communication | -305.8 |
| Human health and social work activities | -295.7 |
| Manufacturing | -195.9 |
| Education | -85.1 |
| Agriculture, forestry and fishing | -44.3 |
| Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use | -14.8 |
| Financial and insurance activities | 240.4 |
| Public administration and defence; compulsory social security | 269.8 |
| Transportation and storage | 326.5 |
| Electricity, gas, steam and air conditioning supply | 837.0 |
| Activities of extraterritorial organisations and bodies | 919.5 |

[2] "The Labor Market Performance of Immigrants in Germany,"—IMF Working Paper No. 16/6—January 21, 2016.