

The Microfinance Collateralized Debt Obligation: a Modern Robin Hood?

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Abstract. The aim of this paper is to highlight a potentially very fruitful link between micro-entrepreneurs and the international capital markets. We discuss the role structured finance and credit derivatives could play in extending finance to micro-entrepreneurs on a much larger scale than today's mainly non-commercial microfinance industry. The mechanisms of so called collateralized debt obligations (CDOs) are described and extended to the microfinance world. Finally, a hypothetical, but realistic, example of such a microfinance CDO (MiCDO) is used to discuss the implications of securitization and tranching of microcredits.

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1. Introduction

Microfinance, also called "women's finance" or "poor man's finance", can be defined as the supply of small-scale financial services such as credit, savings accounts and insurance to poor and low-income people (United Nations (2005)). Microfinance institutions (MFIs), in turn, are the banks/organizations providing these financial services and, today, most of them operate on a non-

commercial basis. The primary role of the many thousand MFIs, or "banks for the poor", that currently operate world-wide is to support the strong but often untapped entrepreneurial spirit that exists in poor corners around the world through the building of an "inclusive financial system" (UNCDF (2006)). At this stage however, although the MFIs have been estimated to reach close to 100 million clients (92 million clients by the end of 2004 (Silverman (2006)) and 80 million clients in 2003 (Wine (2005a))), they actually only manage to meet around 4% of the world-wide demand according to *The World Bank* (Wardle (2005)).¹ The total annual demand for microcredit, the most developed sub-discipline of microfinance, is estimated to \$50 billion (DeSchrevel (2005)) and it is currently growing with an annual growth rate of 15%-30% (Wine (2005a)). Clearly, philanthropy and development aid is not capable of meeting this huge demand and the answer, many think, is commercialization of microlending. Only by letting profit-oriented institutions enter a scene that still largely is dominated by donation-based ones is it believed that one can raise the huge amounts of funds needed to meet the demand. In addition to the increased supply of funds, commercialization would also benefit MFIs and microborrowers by providing loans with

¹ Many figures that are referred to in this text are estimates and approximations. Some figures might also be (deliberately) biased by the institutions reporting them. Finally, some figures might be hard to extrapolate to other countries and time periods because of different and changing institutions.

longer maturities and by providing more diversified funding sources.²

In this paper we embrace the idea of commercial profit-based microfinance and the main purpose of the paper is to highlight a possible fruitful link between micro-entrepreneurs and the international capital markets. We will particularly discuss the potentially important role played by structured finance and credit derivatives in helping commercial microfinance develop faster. While quite a lot has been said in the literature about both commercial microfinance and credit derivatives there is only a very limited literature available on the link between the two. Most of this is written by commercial financial institutions with vested interests in the area and as far as we know, not a single objective academic paper has been written on this very interesting and important topic.

The paper is divided into four parts. The first part discusses the scope for commercial microcredit and how commercialization of this growing market probably is the only way to reach the billions of people in the world who need finance at reasonable terms but for various reasons have no access to it. Important steps that have been taken by the microfinance industry towards such a commercialization, together with future hurdles that need to be overcome, are also discussed. The second part gives an overview of securitization, structured finance and collateralized debt obligations (CDOs). The third part, then, looks at the role securitization and, so called, microfinance (or microcredit) collateralized debt obligations (MicCDOs) could have in the process of providing funding to profitable, but small, microinvestments. Finally, in the fourth part, a hypothetical, but at the same time realistic, example is used to discuss the implications of real world microfinance CDO deals.

² Having said that, however, one should remember that out of today's around 10000 MFIs there are perhaps as few as 250-500 institutions that are commercially viable (BlueOrchard (2006), Garrido (2005)). One likely reason for the small number of commercially viable MFIs is the "crowding out" effect that donor money and government interference has on commercial initiatives. If this is the case, a joint effort by commercial interests and non-profit organizations is needed to boost commercial microfinance.

2. Commercial Microfinance

"Microfinance services are no longer considered a niche market activity that should be confined largely to the development community and carried out solely by specialized microfinance institutions. Today, it is believed that if microfinance is to achieve its full potential, it must be fully integrated into a developing country's financial system with access to vast amounts of human, physical, and financial resources and management know-how", (ADB (2004)). Why would traditional financial institutions be interested in giving \$50 loans to poor women (80% of all microloans are given to women) in rural Nepal or Ethiopia? Why should commercial microfinance loans be treated like any ordinary asset class? Why would microlending be of interest to globally established commercial banks, investment banks or hedge funds? In fact, there are many compelling reasons for why profit-maximizing investors in the City of London or on Wall Street should seriously consider including the many poor neighborhoods around the world in their global investment portfolios. Put differently, there are many reasons why microfinance could give investors the chance to do well by doing good. *First*, of course, is the sheer size of the market. There are currently up to three billion people without access to proper financial services (CGAP (2006b)). There are also an estimated 500 million micro-entrepreneurs (Cheng (2005)) world-wide. For international investment banks this means a largely untapped source of microcredits that, for instance, can be pooled together, securitized and sold to investors all around the world. For local retail banks and the likes, on the other hand, a focus on microcredits to the poor could be a first step in building a brand name in a potentially huge future market for ordinary financial services. *Second*, there is a good chance that the risk-adjusted returns from microlending are higher than returns from corresponding traditional lending. A poor farmer or entrepreneur in the developing world typically generates much higher returns on his or her assets than a corresponding business in the developed world. This means that many of these poor borrowers can afford to pay very much for access to capi-

tal. As an example, look at the so called "5/6 loans" in the Philippines, where a money lender lends you five pesos in the morning if you pay back six pesos in the evening (CGAP (2002a)). This is equal to a daily interest rate of 20%, or much more than 5000% a year. Now, if one compares this to typical interest rates in the developed world and to well documented microfinance default rates in the range of 1-5% one can easily see the potential for commercial microfinancing.³ Even if the cost of making microloans is high (the cost of capital plus administrative costs, loan losses and compulsory MFI equity build-up can easily reach 20-30% of the borrowed amount) this is most likely not a market where all arbitrage possibilities have been exploited (CGAP (2002b)). *Third*, one can expect returns from microloans to be largely uncorrelated with returns from most other asset classes and a microloan portfolio would therefore serve as a natural hedge for a typical investment bank, insurance company or pension fund in, let's say, Europe, Japan or in the US. Furthermore, since diversification is the only real free lunch in the financial world, the discovery of an asset class that is largely uncorrelated with the major economical and political events in the world should attract the interest of any rational investor, big or small. *Fourth*, commercially viable microlending could be an interesting alternative for private investors who (for altruistic motives or for commercially driven "marketing" purposes) want to contribute to the fight against poverty. By directly targeting the poor and therefore circumventing inefficient or perhaps even corrupt government structures, microlending could be an efficient means of doing well (financially) by doing good (socially). *Fifth*, finally, financial markets in the developed world have recently faced a rapid development that could help speed up the commercialization of microcredit. Recently introduced financial

instruments and vehicles, such as credit derivatives and hedge funds, could make it possible for investors to tailor their risks and returns as they please and thereby transform the microfinance landscape from a small subsidized market to a large efficient market with thousands of profit-maximizing investors with different appetites for risk.

There are several hurdles to overcome on the way, however. *First*, mainstream investors and commercial banks are used to deal with regulated entities organized as profit-maximizing firms that can go bankrupt and that work in a clearly defined legal environment. To facilitate the MFIs' role as middle-hands and to facilitate their contacts with these mainstream financial institutions, the MFIs have to be transformed from the typical non-governmental organizations with weak corporate governance they are today into ordinary regulated banks/financial institutions run by professional managers. *Second*, macro policy and government regulation has to be adapted to accommodate commercial microlending. Stable currencies and predictable inflation rates are also important as is a proper financial infrastructure and prudential MFI regulation. While such an environment already is in place in many countries there are also cases where interest rate caps and other regulations make it hard or impossible to sustain profitable lending on a larger scale. *Third*, if the international capital markets are to be tapped on a larger scale, the MFIs/investors have to be able to hedge the foreign exchange risk that appears when they borrow/lend in a foreign currency. Unfortunately, in the countries where microfinance is in greatest need there are often no effective means of reducing the currency risk.⁴ *Fourth*, multilateral development banks, donors and the likes would probably have to rethink their strategies and start finance the development of institutions and technical knowhow that could make microlending more efficient instead of lending directly on subsidized terms. Currently, there is evidence of subsidized lending crowding out commercial lending

³ The low default rates are in part caused by innovative MFI lending techniques such as group lending (solidarity lending) and in part due to the simple fact that if the microborrower defaults on the microloan she will normally have no other options left. The credit quality of the average borrower could of course start to fall when the client base is widened, but considering the still largely unserved pool of borrowers (perhaps 90% of the entire potential pool) this is most likely a problem for the distant future.

⁴ In a survey made by *The World Bank-affiliated Consultative Group to Assist the Poor* (CGAP) up to 50% of the existing MFIs have no possibilities to protect themselves against currency risk (Ivatury and Abrams (2004)).

and this is unfortunate since donation-based organizations probably never will be able to reach the masses that commercial funding sources potentially could (Puglielli (1996), CGAP (2002c), EscobarDeNogales (2005)).

What important steps towards commercialization have then been taken by the microfinance industry? One important step is the recognition of the need for economies of scale. This development has materialized itself in many ways. For instance, there are cases of MFIs starting to organize themselves as banking networks where each MFI has to follow the same standard.⁵ Perhaps even more importantly, several commercial microfinance debt funds have been launched over the last couple of years. Typically, these investment funds are set up by major international banks who finance MFIs by selling shares of dollar-denominated debt funds to investors.⁶ In addition to global fund offerings like these there is of course also scope for local debt market issuance and some examples of such offerings have been seen in larger developing countries such as Mexico and India (Meehan (2004), Wine (2005a)).⁷ As the number of high-quality MFIs around the world grows, the size

⁵ *The ProCredit Group*, for instance, is a network comprising 19 MFIs in Latin America, Central Europe and Africa with a total of more than 560000 outstanding loans (ProCreditHolding (2006)). The ProCredit MFI network claims to combine a development policy orientation with a commercial approach and it is likely that such networks of MFIs will lead to greater transparency as well as efficiency in microlending.

⁶ Examples of such funds are *The Dexia Micro-Credit Fund* launched in 1998 by *Dexia Banque Internationale a Luxembourg* (DeSchrevel (2005)), *The responsAbility Global Microfinance Fund* launched in November 2003 by a group of Swiss banks, including *Credit Suisse* and the *Raiffeisen Banking Group* (responsAbility (2005)), *The Global Commercial Microfinance Consortium Investment Fund* launched in 2005 by *Deutsche Bank* and a consortium of private and public sector institutions (Baue (2005)), an *unnamed* microcredit fund set up by the Dutch pension fund *ABP* in 2005 (van den Oever (2005)), and *The Omidyar-Tufts Microfinance Fund* launched in November 2005 by Pierre Omidyar, the founder of *eBay*. For more information on these and other funds we refer to *The MIX Market Microfinance Information Exchange* (TheMIX-Market (2006)).

⁷ One example is *Compartamos*, the large South American microlender, who in 2004 (and in 2005) issued Peso-denominated bonds aimed at the Mexican investor (Meehan (2004)). Thanks to a 34% credit guarantee from the *International Finance Corporation* (IFC) the deal got an AA rating by both *Standard & Poor's* and *Fitch Ratings*.

and number of debt funds (global as well as local) built around these MFIs will also grow, and this together with the huge pools of small and large scale investors both in the developing world and in the developed world will, again, lead to the earlier mentioned economies of scale. Another interesting commercial development, which will be discussed in the following chapters, is securitization of microfinance loans. Instead of MFIs exposing themselves to the credit risk associated with lending to thousands of micro clients, the MFIs can simply serve as middle-hands and channel the risk and return of the pooled loan portfolio to a third party in the form of well defined standardized securities. These securities are backed by the actual microloans (they are so called asset-backed securities) and they can take different shapes with different risk-return profiles, different maturities and so on. Moreover, until a significant number of MFIs, themselves, have developed the know-how needed to issue this kind of asset-backed securities it is also possible for financial firms higher up in the value chain to pool together and securitize ordinary loans given to the MFIs.⁸ This indirect securitization of microcredits is the topic for this paper and it will be discussed at some length in later

⁸ One of the first asset-backed securities of this kind was issued by the microfinance investment consultancy *BlueOrchard Finance SA* (together with the US investment advisory group *Developing World Markets* (DWM)) in July 2004 and it was the first that was structured as a collateralized debt obligation (CDO) (Meehan (2004), DeSchrevel (2005)). It was issued in US dollars, had a time to maturity of 7 years, a nominal amount equal to \$40 million and, as the first microfinance CDO, it was partly guaranteed by *OPIC*, a US development agency. The deal referenced 7 MFIs in Latin America, 1 MFI in Russia and 1 MFI in Cambodia and reached a total of around 40000 micro-entrepreneurs (Mehta (2004)). Like any other CDO it had the nice feature of offering a range of different securities (tranches) with different risk-return profiles within the same product and the *OPIC* guarantee attracted large numbers of investors to the deal. Eventually, the deal was oversubscribed within an hour (Wine (2005a)). In May 2005 *BlueOrchard Finance SA* made an additional offering along the same lines (referencing fourteen MFIs and raising an additional \$47 million) and in this closing the partial guarantee by *OPIC* was down to 35% (from 75% in the first closing). This is probably a reflection of an increased market confidence with this type of microfinance investments. Finally, in April 2006 *BlueOrchard Finance SA* and *Morgan Stanley*, together, launched the first public microfinance CDO (referencing 22 MFIs and raising \$106 million).

chapters. Finally, an important commercial development in a somewhat different direction is the appearance of niche credit rating agencies that are specialized in rating MFIs.⁹ While *Moody's Investors Service*, *Standard & Poor's* and *Fitch Ratings*, the traditional rating agencies, this far largely have shun the microfinance market, probably because of lack of "MFI number and volume" and lack of "MFI purchasing power", the microfinance rating agencies have developed their own rating techniques tailor-made for assessing MFIs. The rating agencies have an important role to play by providing objective default histories/track records of MFIs; either on an individual level or on a sector by sector or region by region level. Developments in this direction are crucial in order to attract larger volumes of commercially oriented risk-sensitive microfinance investors.

3. Collateralized Debt Obligations

In this chapter we will give a brief introduction to collateralized debt obligations (CDOs). In the next chapter we will then go on to focus on how this particular tool from the world of structured finance potentially could speed up the commercialization of microfinance.¹⁰

Securitization, the issuance of securities directly backed by a pool of loans, bonds or other assets, has been around since the early 1970s.¹¹ It has two important characteristics. First, the pooling of a large number of assets, such as loans, that are used as collateral for (asset-backed) securities issued by the originating firm, and, second, the de-linking of the credit risk of the pool of assets from the credit risk of the originating firm. The de-linking is typically done through a transfer of the underlying assets to a stand-alone special purpose vehicle (SPV) that is closely associated with, but legally de-coupled from, the originator (Mitchell (2004)). The SPV is then issuing

⁹ Notable examples are *M-Cril*, *MicroRate* and *PlanetFinance*.

¹⁰ In the case of microfinance we typically deal with loans and we could therefore use the term collateralized loan obligation (CLO) instead of CDO. In what follows, however, we have chosen to stick to the more general term CDO.

¹¹ Ginnie Mae securitized mortgages in the US already in 1970.

securities backed by the underlying assets. To highlight the risk-transferring idea behind securitization, the asset-backed securities in a securitization deal are sometimes called pass-through instruments.

Structured finance, on the other hand, can be defined as securitization combined with a tranching of the issued asset-backed securities.¹² The tranching is done by the SPV and splits the cash flows from the underlying pool of assets into several separate classes of securities with different risk-return profiles. The securities are typically constructed to have different seniority in the sense that "junior" tranches alone keep absorbing losses up to a certain point before the more "senior" tranches start to suffer losses. The original risk of the underlying asset pool is in this way split up into low-risk and high-risk securities and the holders of the senior tranche securities are therefore protected from the first defaults in the underlying asset pool. The different tranches attract different investors and one can expect less informed investors to be particularly willing to buy the senior tranches as alternatives to other low-risk investments like treasury bonds, and more informed investors to buy the much more risky junior tranches. Three important consequence of the tranching process are: (1) that the most senior tranches can have a higher creditworthiness than the average asset in the underlying pool, (2) that all but the most junior tranche can be rated despite the pool being made up of unrated assets, and (3) that by joining forces, a few well-informed, or just risk-tolerant, investors can attract large numbers of less informed, or more risk-averse, investors to invest in a pool of assets they would otherwise not invest in.

A collateralized debt obligation (CDO), in turn, is a particular kind of structured finance instrument where the underlying pool to be securitized typically contains a smaller number of assets (perhaps 50-150) than that of a traditional securitization product (which can be made up of thousands of assets). The assets are also typically more heterogeneous than in a traditional securitization deal. As a consequence, the default risks of the individual assets as well as the default correlations between the

¹² Or securitization combined with some other kind of credit enhancement, such as a (partial) credit guarantee.

various assets are critical to determining the loss distribution of the pool. Furthermore, while the assets in a classical securitization typically are fairly small ordinary loans such as car loans and credit card loans, the assets in a CDO are often more innovative. Examples of assets are investment-grade bonds, leveraged loans, asset-backed securities or credit default swaps, and there are even examples of CDOs where the underlying assets themselves are CDOs.

Compared to traditional securitizations the fairly small heterogeneous pool of complex assets in a CDO often requires active management by a skilled CDO manager. In fact, in a way a managed CDO is similar to an ordinary firm run by a CEO (the CDO manager) that makes investments (the assets used as collateral) using publicly raised funds (the asset-backed tranches). Similar to how equity, junior debt and senior debt issued by a firm can be seen as alternative claims to the underlying assets of the firm, the tranches of a collateralized debt obligation can be seen as different claims to the pool of underlying assets of the CDO (Lando (2004)). Along these lines, the irrelevance of a firm's capital structure (Modigliani and Miller (1958)) must hold for the CDO (or more exactly the CDO-issuing SPV) as well, at least in an ideal Modigliani & Miller world. In fact, it is only in a situation with real-world imperfections that the tranching adds value, and in the next chapter on microfinance CDOs we will discuss some of the imperfections that one can expect to find in the case of the microfinance industry.

Collateralized debt obligations have been around since the late 1980s, and over the recent years CDOs have been one of the fastest growing segments of structured finance. The market for CDOs is now an important part of the global debt market, but since the market is fairly opaque it is difficult to estimate its exact size. There are, however, experts that estimate the market to be worth as much as \$500-\$1000 billion (Beales (2005)).

Let us now look at an example of how a CDO can be structured. The CDO is pictured in Figure 1. Consider a bank (the originator) that holds a portfolio of 100 loans, each with a nominal amount of \$1 million and a matu-

urity of one year. We furthermore assume that all the loans have zero recovery rates, i.e. if a borrower defaults on a loan the lender will lose the entire investment. The loan portfolio is financed by debt issued to investors through a SPV that is legally insulated from the bank, and in this way the bank has been reduced to a mere middle-hand between the borrowers and the investors. The loans make up the collateral of the debt bought by the investors and each interest rate payment made by the borrower (net of administrative costs) is simply passed through to the investor. The debt issued by the SPV in a typical CDO is tranching in the way described above and in this example there is a junior "equity" tranche with a nominal value of \$10 million, a somewhat more senior "mezzanine" tranche with a nominal value of \$20 million, and finally the most senior "senior" tranche with a nominal value of \$70 million. This means that three different securities (tranches) collateralized by the same pool of loans have been issued by the SPV. Now, the holders of the most senior tranche, which also is the safest tranche, will be repaid the full nominal amount, \$70 million, as long as less than 31 loans have defaulted. However, if more than 30 loans default the senior tranche holders will have their nominal amounts reduced accordingly and the mezzanine and equity tranche holders get nothing. Similarly, if 10 or less defaults occur, the mezzanine tranche holders will be repaid the full nominal amount together with the senior tranche holders, and the holders of the (risky) equity tranche receive the residual. If between 10 and 30 loans default the senior tranche holders will be paid back in full while the mezzanine holders will have their nominal amounts reduced accordingly and the equity tranche holders get nothing. In essence, the equity tranche holders are only paid after the more senior tranche holders are repaid; i.e. they are only paid anything if less than 10 loans have defaulted. The equity tranche is consequently the most risky tranche and the amount that the holder of the equity tranche receives is the residual amount that is left after the senior tranche holders have been paid.¹³

¹³ More senior tranche holders, on the other hand, are promised certain regular coupon payments as well as the nominal amount at maturity.

This is similar to how equity holders are the residual claimants to the assets in a firm after the debt holders have taken their shares and this is the property that has given the equity tranche its name. The equity tranche is similar to equity also by giving the highest expected return among the different claims in the CDO "capital structure". Naturally, if the expected loss of a one-year maturity CDO tranche is $EL\%$ one can also expect a one-year credit spread of about $EL\%$; i.e. the one-year interest rate offered on the tranche has to be around $EL\%$ above the one-year risk-free rate (Saunders and Allen (2002)).¹⁴

The "water fall" structure described above is the basic feature of a CDO (that sets it apart from a classical securitization product) and the basic idea is to repackage the risks and returns in the underlying pool into securities with different seniority that appeal to different investors. Just like ordinary corporate bonds, CDO tranches are often rated by the major rating agencies; i.e. *Moody's Investors Service*, *Standard & Poor's* and *Fitch Ratings*. This has become a very lucrative business for these agencies. For instance, in 2003, structured finance accounted for more than 40% of *Moody's* rating revenues (CGFS (2005)). While structured finance ratings and traditional debt ratings both provide independent opinions about the creditworthiness of a certain instrument they differ in at least two, related, respects. First, since structured products often are based on portfolios of credits (the CDO is just one such example of a multi-name structure), it is not sufficient with the individual obligors' default probabilities to rate the deal, but the default correlations are equally important (Fender and Kiff (2004)). This adds an extra dimension of complexity to the rating process and this is probably one reason for the profitability of the business. Second, in the rating process of traditional debt instruments, the rating agency has very limited contacts with the issuer before the actual rating decision. In the rating of structured products, however, the rating agency is usually heavily involved in the actual structuring of the deal. Since the issuer can adjust the relative credit char-

acteristics of the various tranches prior to issuance, the issuer and the rating agency can have an ongoing iterative dialogue through the entire rating process on the details of the structured deal in order to reach a common target.

4. Microfinance Collateralized Debt Obligations (MiCDOs)

In this chapter we will discuss how securitization, and particularly collateralized debt obligations, could be used to speed up the commercialization of microfinance. In fact, many believe that microcredit could develop into an asset class like any other through a wide-spread securitization of commercial microloans: "*Proponents admit there are hurdles to overcome, but argue that microfinance securitization is in the same early stage of development as credit card securitization was in the 1980s and mortgages more than half a century ago. They contend that microfinance will experience the same growing pains, but eventually become a well-established asset class*" (Wine (2005b)).

There are different ways for the MFIs and the international capital markets to meet. On one hand, the MFI can borrow in the international capital markets directly. This is not securitization, per se, since the assets are still on the balance sheet of the MFI (the MFI is still exposed to the credit risk of the microborrowers). As mentioned earlier, there are several examples of how viable MFIs in this way have borrowed directly in the capital markets through debt funds set up by commercial banks.

On the other hand, instead of the MFI itself borrowing in the capital market to finance its lending to the microborrower, the MFI can simply transfer the actual assets (the microloans) from the balance sheet to the investor. This is securitization and it could potentially be a viable way for microborrowers to get access to capital. One reason for this is that the creditworthiness of the MFI is of subordinate interest and it is now the (historically impressive) credit health of the pool of microloans that is important for the capital market. By bringing the actual borrower closer to the global capital market there

¹⁴ Here we ignore other factors that might contribute to the credit spread, like a credit risk premium or a liquidity risk premium.

might also be efficiency gains to make. Up until today there are very few examples of this, the purest, form of microfinance securitizations.¹⁵

Furthermore, and as mentioned earlier, an alternative to the MFIs themselves securitizing their assets in this way is for financially more sophisticated firms, such as international investment banks and hedge funds, to pool together and securitize the MFI-issued debt. In the short term, this is probably a more realistic alternative if substantial volumes are to be reached.¹⁶ Most of the ex-

¹⁵ A deal made by the Indian bank *ICICI* in 2004 was one of the first direct microfinance securitizations ever. In this securitization *ICICI* bought a portfolio of 42500 microloans from *SHARE Microfin Ltd*, a large Indian MFI, for \$4.3 million (Meehan (2004)). The portfolio contained 25 % of *SHARE*'s loans and the transaction was facilitated by a \$325,000 guarantee provided by the *Grameen Foundation USA*. The purpose of the deal was purely commercial; *SHARE* could use the \$4.3 million to scale up its lending (to the poor) and *ICICI* could access a hard-to-reach market (the poor) through a well run MFI. Eventually, though, *ICICI* sold the portfolio to another commercial bank. Furthermore, through a significant direct microfinance securitization, *RSA Capital, Citigroup, KfW Entwicklungsbank* (KfW) and *Netherlands Development Finance Company* (FMO) bought \$180 million worth of microloans from *Bangladesh Rural Advancement Committee* (BRAC) in July 2006. The deal will provide BRAC with financing for six year and it is estimated to involve loans to nearly 1.2 million microentrepreneurs (BRAC (2006)).

¹⁶ One of the first asset-backed securities of this kind was the earlier mentioned *BlueOrchard Finance SA* securitization(s). This securitization was structured as a collateralized debt obligation (CDO) and the first issue (in 2004) was the first ever international microfinance securitization. In 2005 *BlueOrchard Finance SA* offered a second issue on similar terms and in April 2006 *BlueOrchard Finance SA* and *Morgan Stanley* issued the first public microfinance CDO. The latter was not only the first microfinance CDO aimed at mainstream investors, but it was also the first where the loans to the MFIs were made in emerging currencies (Mexican pesos, Columbian pesos and Russian roubles). Furthermore, the currency risk was hedged through a currency swap arranged by *Morgan Stanley* (Peterson (2006)). The first CDO aimed at an MFI network, in turn, was the collateralized loan obligation (CLO) structured by the consultancy company *Symbiotics SA* and the *European Investment Fund* (EIF) in November 2005. This deal was arranged to support Eastern European MFIs within the microfinance network *Opportunity International* and it was structured to allow for a simple execution of repeat deals. Further issues are expected in 2006 (Symbiotics (2006)). Finally, in June 2006 *Developing World Markets* (DWM) (together with *Symbiotics* and *Global Partnerships*) structured the first rated microfinance CDO (DWM (2006)). The offering was rated by *MicroRate*, the niche rating agency.

isting indirect securitizations along these lines have been structured as collateralized debt obligations. Now, why is that? Why did these investment banks/fund managers not settle with simpler traditional securitization deals? We can of course not answer this question with certainty. We can, however, try to throw some light on this issue by returning to the world of mainstream CDOs.

As mentioned above, if markets work perfectly there is less need for collateralized debt obligations. Pass-through securitization would suffice. Two imperfections that might create value to a CDO, however, are asymmetric information and market segmentation (Mitchell (2004)). Moreover, both these features are important characteristics of the microfinance industry and they give us strong arguments for why the use of CDOs instead of ordinary securitizations is motivated in the case of microfinance.

Asymmetric information in a microfinance securitization reveals itself through an information advantage of the originator of the securitization/CDO (the bank that is specialized in lending to MFIs) over the typical investor regarding the quality of the loans in the pool. This causes the investors to demand an extra premium to compensate for the information disadvantage and it is a typical example of the so called "lemon phenomena" (Akerlof (1970)) where the investors are afraid that the originator will repackage and sell "problem debt" with risks that only the originator itself knows about. The problem is likely to be particularly prevalent in the microfinance industry where the information advantage of the originating firm over the investors is huge. Now, the tranching of a typical CDO solves this asymmetric information problem efficiently by supplying the (less informed) investors with safe senior tranches with very low default probabilities at the same time as the originator retains the risky equity tranche itself. In this way the originator will be the first to suffer losses if the loans are of low quality.

Market segmentation, and the arbitrage opportunities it causes, can also help create value from tranching (Mitchell (2004)). If the originator possesses private information about certain investors, it can create securities that are tailor-made for these investors' special

demands. For instance, restrictions imposed by investor traditions or government regulations, or a mispricing of bonds that varies across the different rating categories, or a limited supply of a certain category of bonds, might be circumvented by an intelligent tranching that meets the needs of the investor. The CDO originator can then keep a share of the premium that the investor is prepared to pay to invest outside its "feasible investment domain". In the case of microfinance loans there are many reasons to believe that risk-return profiles and natural hedges that are unattainable through traditional securities could be achieved through microfinance CDOs (MiCDOs). Through tranching it could be possible to attract investors that normally would never consider making (or be allowed to make) retail debt investments in an emerging market. In this way the tranching can help complete the market. Of course, for the originator to be able to make market segmentation-induced arbitrage profits from the tranching it must be impossible, or at least difficult, for other originators to follow suit. As mentioned above, CDOs often reference non-standard assets and one reason for this is the difficulty it creates for other originators to replicate the deal. Luckily for the MiCDO originator, this is exactly the situation in the microfinance market of today where the assets (the microloans) must be considered highly unconventional. This lends further support to the hypothesis that tranching and collateralized debt obligations are particularly suitable for the microfinance industry.

In order for a microfinance CDO to work in reality there are of course a number of criteria that have to be met. For one thing, a critical (minimum) number of financially healthy borrowers is needed in order to make microfinance commercially viable. Unfortunately, this is something of a vicious circle; if no commercial funding is available the market will never reach a critical mass and if the market is not allowed to grow without distortions there will never be sufficient commercial interest in microfinance lending. The governments, locally as well as globally, have an important role to play here in facilitating the lives of commercial MFIs. For instance, governments and development aid agencies have to make an

end to the all too common crowding out of the commercial microfinance sector by state-subsidized MFIs. One way of doing this is for the donors to spend money on the development of a viable, efficient and competitive microfinance securitization/credit derivative market instead of on direct subsidized lending. If successful, this could eventually lead to the reasonably cheap and, importantly, permanent financing for billions of people that public aid- and private philanthropy-based microfinancing has failed to offer.¹⁷

To conclude the discussion on the merits of structured finance in the process of extending microcredits to the huge masses that still lack funding for their ventures we again cite *The Asian Development Bank* (ADB (2004)): "However, the most powerful forces that may lead to a quantum jump in the scale of financial services for the poor will most likely come from the technological changes that reduce risk and transaction costs and from market liberalization and product and process innovations that increase competition in domestic financial markets."

5. Lessons Learnt From a Realistic MiCDO Example

In this chapter an example of a hypothetical microfinance CDO in Asia will be presented. We will start by looking at the general features of such an instrument. We will then look at the structure from different angles and reflect on different aspects of it. Problems and possibilities that might be faced in the future are also discussed.

5.1. Overall features of the Example MiCDO

We will now try to give a realistic example of how microfinance CDOs (MiCDOs) could be used to pool

¹⁷ Needless to say, at the same time one has to acknowledge the extremely important job done so far by the donor community. Had it not been for the developments in donor-based microfinance over the last three decades there would be no platform on which to build a more commercially based "inclusive financial sector". Moreover, there will most likely always be certain niche markets (perhaps the poorest borrowers) available for donor money.

resources from ordinary Joneses and Smiths in Europe and the US to subsistence farmers, micro-entrepreneurs or traders in Asia.¹⁸ The main reason for us to choose Asia as an example is Asia's huge population and consequent potential for microfinance in general and structured microfinance in particular. In 2004, the number of microloans in Asia was estimated to be around 40 million (ADB (2004)) and the number of credit rated MFIs (i.e. MFIs that are likely to be more or less viable) just in South Asia were 123 (ADB (2004)).

Our hypothetical MiCDO is assumed to reference 50 MFIs equally distributed across five Asian countries; Bangladesh, Cambodia, India, Indonesia and the Philippines. By choosing many countries we gain diversification when it comes to both country risk and currency risk. Furthermore, a multi-country focus is probably necessary considering the current lack of viable Asian MFIs. An important observation to make is that out of these countries India actually has interest rate caps in place. This can certainly create problems for the various parties in the CDO deal, but due to its size and earlier success in arranging structured microfinance deals India is included in the deal anyway. The exposure to each of these 50 MFIs is assumed to be \$1 million.¹⁹ The MFIs are all assumed to be independent of each other which means that a default of one MFI neither increases nor decreases the likelihood of another MFI defaulting. This assumption of independence is not critical for the general discussion held in this paper but it is important to remember that in a more specific real-world application the default dependency among the assets in the pool is

a very important piece of information (see below). The maturity of our MiCDO, in turn, is not critical for the discussion that follows, either, but following the convention in more mature credit derivative markets we choose a loan-portfolio maturity equal to five years.²⁰ Finally, the loan is denominated in US\$. This is purely done for reasons of simplicity and the problems that might arise due to this are discussed below.

Much has been written about the low levels of default rates (or loss rates) observed in the microfinance sector; for instance, Cowley (2006) refers to average repayment rates of 95%, DeSchrevel (2005) refers to repayment rates of 97%, Cheng (2005) refers to repayment rates of 97% for leading MFIs, Wine (2005b) refers to repayment rates of 95%, *The China Foundation for Poverty Alleviation* (GlobalEnvision (2003)) records a repayment rates of 97%, Wardle (2005) cites evidence of 99% repayment rates at the *Grameen Bank* and CGAP (2002b) quotes loss rates in the range of 1%-2% for good MFIs and below 5% for viable MFIs in general. At the same time, however, there is also evidence of many of these figures being deflated; Meyer (2002) stresses, for the particular case of Bangladesh, evidence of MFIs exaggerating their repayment rates, Wine (2005b) refers to *MicroRate*, the rating agency, according to which one should be wary of MFIs manipulating repayment rate figures, and Silverman (2006) refers to the *The MIX Market Microfinance Information Exchange* that acknowledges that data on default and repayment rates can be tough to verify. In our hypothetical MiCDO we draw on this criticism and assume a conservative average loss rate of 5% despite "portfolio at risk" (average default rates) in Asia being reported to be around 2% (BlueOrchard (2006)). Since the average microloan in Asia has a tenor of about one year (Wine (2005b)) we can assume that the loss rates given above are on a yearly basis. We furthermore assume that the recovery rate faced by the MFIs on their microloans is equal to zero which means that default rates and loss rates are identical. Now, the MiCDO can be constructed in various ways and the exact details of whether

¹⁸ While, traditionally, the Asian microfinance industry has focused more on the very poor in rural areas, the range of borrowers has recently been extended to include low-income urban micro-entrepreneurs and the like. This broadening of the client base is partly driven by commercial interests and it is likely to speed up the commercialization of the Asian microfinance market.

¹⁹ Considering that an average microloan in Asia is around \$200 (Weiss and Montgomery (2004)) this would mean that the MiCDO would finance something like 250000 micro-entrepreneurs. It also means that the \$50 million MiCDO issue is similar in size to both the first *BlueOrchard* CDO and to the *Symbiotics* CDO (that had nominal amounts equal to \$40 million and Euro 30 million, respectively).

²⁰ The maturity of the *BlueOrchard* CDO was seven years and the *Symbiotics* CDO was four years.

the CDO is collateralized by the 50 MFIs or by the 250000 micro-entrepreneurs are not discussed in this paper. In any case, however, we assume that the default rates on individual MFI loans (the credit worthiness of the MFI) are identical to those on individual microloans (the credit worthiness of the micro-entrepreneur). We believe this to overestimate the actual risk of a MFI defaulting since it ignores the diversification in the MFI's loan portfolio; essentially, it assumes that microloan defaults in the MFI portfolio are perfectly correlated with each other, which clearly is not the case. To summarize, the assumptions made above mean that the one-year default probability as well as the one-year expected loss of any of the 50 MFIs in our conservative example is 5%.

When it comes to microcredit interest rates in the countries in our study they have been estimated by the *Consultative Group to Assist the Poor* to be (in 2003/2004) approximately 20%-35% in Bangladesh, 45% in Cambodia, 20%-40% in India, 28%-63% in Indonesia and 60%-80% in the Philippines (CGAP (2004b)).²¹ Data from *MicroBanking Bulletin*, in turn, shows that average *real* rates in Bangladesh, India and Indonesia in 2003 were around 30%, 30% and 60%, respectively (Dehejia, Montgomery and Morduch (2005)). If we assume these rates to hold for our hypothetical example this gives us an average *real* loan rate (to the micro-entrepreneur) of about 40%-50%. The interest rates for the loans to the MFIs, in turn, are assumed to be much lower in order for the MFIs to be able to cover their administrative costs. In real life situations, BlueOrchard (2006), for instance, estimates the MFI microcredit spread over ordinary monetary instruments to be around 1-2%, and the *Consultative Group to Assist the Poor* claims that investors in microfinance debt funds expect annual returns between 1% and 5% (Silverman (2006)).²² Our hypothetical MiCDO is supposed to have three tranches and the division of in-

terest rates to the different tranche holders will depend on how the tranching is made and on the default correlation between the various MFIs. Different tranching scenarios are discussed at some length below and the resulting interest rates are compared to interest rates of mainstream debt products with the same expected loss rates. Tranche credit ratings that correspond to these loss rates are also given.

At the first glance, the huge difference between the borrowing rate and the lending rate of a typical MFI is somewhat surprising. However, the significant difference is motivated by the various costs and provisions associated with making microloans. Administrative costs make up a large part of these expenses. There is also a need for the MFI to build up equity (to be able to expand its lending activities or to use as a reserve against unforeseen events) and one therefore has to accommodate for some MFI profits. Finally, when the MFI is raising funds in a foreign currency, currency risk is also an important issue. In our hypothetical example we try to acknowledge all of these costs as accurately as possible in order to arrive at reasonably realistic interest rates offered to the various CDO investors. First, in order to include reasonable administrative costs in our example we follow both the *Consultative Group to Assist the Poor* (CGAP (2002b)), who estimates administrative costs of mature MFIs (as a share of the loan portfolio size) to lie in the 10%-25% range, and the *MicroBanking Bulletin* (CGAP (2002a)) who estimates the administrative costs of financially self-sufficient MFIs in Asia to be 18.9%. Based on these figures, we somewhat conservatively assume the administrative costs associated with the MFIs in our CDO to be 20% of the loan portfolio size. We also follow the *Consultative Group to Assist the Poor* in their recommendation that an MFI should have a capitalization rate of at least 5%-15% of the loan portfolio to support long-term growth. We choose 10% in this study. Moreover, in our example the currency risk is assumed to be borne by the MFI (instead of by the micro-entrepreneur or by the investor). Considering the difficulties MFIs in our five Asian countries probably would have to hedge this risk at low cost (CGAP (2006a)), a compensation for the cur-

²¹ We assume that these interest rates are *real* rates.

²² In the earlier mentioned *Dexia Micro-Credit Fund* deal the credit spread charged to the MFIs is 5-8% (Cheng (2005)). The *BlueOrchard* deal, in turn, had five tranches with coupons on the four more senior tranches equal to the US Treasury rate plus 0.5%, 1%, 2% and 4%, respectively (Meehan (2004)). The expected return on the equity tranche is of course much higher than those on these four tranches.

rency risk exposure is necessary. First, the MFIs would need to be compensated for the expected exchange rate depreciation. Second, on top of that they would probably demand a risk premium just to take on this currency risk (the expected depreciation is just an estimate of the "average" depreciation). With no available information on the appetite for currency risk among MFIs in these countries, we make the, admittedly, rather ad hoc assumption that the MFIs demand a risk premium of one standard deviation on top of the expected exchange rate move to take on the currency risk. Since the historical exchange rates in the five countries in the example have depreciated on average 0.6% against the US Dollar on a yearly basis over the last five years (with a standard deviation equal to 4.7%)²³ this would mean that the total compensation to the MFI for the currency risk exposure would be about 5%.

5.2. Reflections from studying the Example MiCDO

Microfinance investments promise high risk-adjusted returns Using the (conservatively) estimated deductions for administrative costs, MFI-profit retention and currency risk above, and if we temporarily assume that the microfinance CDO is a single-tranche structure, the annual net interest rate paid to the investor (the ultimate debtor) would be around 13% (8%) if the microborrower (the ultimate creditor) borrows at 50% (45%), after a conservatively estimated CDO administrator/originator fee of 2% has been deducted.²⁴ Even if the single-tranche CDO investor would require a default risk premium (as a compensation for unexpected default losses) in the range

²³ Means and standard deviations of the historical exchange rate change (depreciation) distributions in the five countries were: Bangladesh (3.6% and 3.3%), Cambodia (1.4% and 2.9%), India (-1.8% and 3.5%), Indonesia (-1.5% and 10.1%) and the Philippines (1.6% and 3.6%). Source: *EcoWin AB*.

²⁴ The management fee of *The Dexia Micro-Credit Fund* is 2.5% (Cheng (2005)), the management fee of *The Responsibility Global Microfinance Fund* is 2.2% or less (responsAbility (2005)), the management fee of the *BlueOrchard* CDO is 1.06% (BlueOrchard (2006)) and fees of mainstream CDOs usually lie in the 1.5%-1.75% range (Bloomberg (2005)).

of 1-2%²⁵ an interest rate of 13% (8%) would be sufficient to cover expected annual default losses of 5% on individual loans in the pool even if we use our conservative estimates of costs and provisions above and if we temporarily assume perfectly correlated MFI defaults. Consequently, with US treasury bond rates lying in the 2%-5% range, it should be possible to attract investors to the single-tranche CDO exemplified above if the interest rate (on the only tranche) was 13% (8%). As a comparison, one could mention that expected losses, on individual loans in the pool, equal to 5% roughly correspond to structured products with Moody's B2 ratings²⁶. Historically, B2 rated corporate bonds have offered credit spreads around 3%²⁷.

Structured microfinance could be a lucrative fee-generating field for financial intermediaries Commercial microlending is still in its infancy and only a small share of the huge pools of poor people in the world with borrowing needs currently has access to formal funding, whether it is through microfinance programs or through the regular financial system. This means that an almost entirely untouched market lies at the feet of the investment community. In this context, intermediation of microfinance CDOs could be a profitable complement to traditional activities; initially, limited competition is likely to generate profit margins high enough to compensate for the small scale of the operations, and further down the line, an exponential market growth should be sufficient to more than compensate for shrinking profit margins. If one compares to similar activities in mainstream CDO administration and origination, and as long as future MiCDO

²⁵ This size of the risk premium would mean that about 10%-20% of the credit spread is made up of the risk premium and if we ignore other possible contributors to the spread, such as liquidity risk and tax-related effects, this figure corresponds quite well with what has been quoted in the literature. Berndt, Douglas, Duffie, Ferguson and Schranz (2005), for instance, finds a risk premium that varies from approximately 10% for low-grade firms to approximately 40% for high-grade firms.

²⁶ We refer to *Moody's Idealized Loss Rates* (Moody's (2005)).

²⁷ Here we refer to historical spreads for B2 rated banks in the *Moody's* universe and the spreads are provided by *Bridge Information Systems* (DataMetrics-Education (2006)).

deals are not significantly more expensive to arrange than traditional CDO deals, one could ultimately expect fees in the range of 1.5%-1.75% (Bloomberg (2005)). Importantly, a fee-generating microfinance business is also expected to lead to diversification gains for most global banks and there is no reason to expect such microfinance activities to crowd out other banking and investment activities.

A reduction of administrative costs and currency risk transfer costs would significantly enhance the investors' returns and/or reduce the interest rates charged to microborrowers The administrative costs of the MFIs could probably be reduced significantly from today's 15%-25% through increased competition, economies of scale and technological advances. A reduction of administrative costs from 15%-25% to let's say 10%-20% could be used to boost CDO returns and/or lower the micro-entrepreneur's borrowing costs with an equivalent amount. Obviously, this would be a very significant change. The same holds for the transfer of currency risk. If efficient methods for transferring currency risk were in place in the MFI countries then the compensation for currency risk could be reduced significantly.

If the gains from improved lending strategies and risk management techniques is split equally between the borrower, the MFI, the MiCDO originator and the investor (which seems logical in a competitive environment) we could perhaps see borrowing rates as low as 40% coupled with much larger supplies of funds. These increased volumes could in turn create even more innovation, which would lead to even lower costs, which would attract even more interest from the investors, and so on.

The interest rate paid by the microborrower is low compared to other alternatives and compared to the possibilities the loans provide While interest rates in the 40%-50% range might seem high, we should remember the extremely expensive alternatives. For instance, interest rates in the informal sectors are reported to be 180%-240% in Bangladesh, 120%-180% in Cambodia, 24%-120% in India, 120%-720% in Indonesia and 120+% in the Philippines (CGAP (2004b)). On average, this is about

four times the interest rate charged by the hypothetical MFIs in our MiCDO. We should also remember that as microcredit markets become more competitive, interest rates are likely to come down significantly. Furthermore, even at the high interest rates in the informal sector there seems to be a demand for loans and the reason is of course that the typical borrower still prefers these high-interest rate loans to no loans at all since they improve their quality of life in one way or another. In fact, in many countries the sheer availability of funds, even if limited to high-cost informal funds, can make a significant difference for a micro-entrepreneur; for instance, for micro-businesses in India, Kenya, and the Philippines the average annual return on assets in the microfinance community has been found to be as high as 117%-847% (CGAP (2002a)). Also, the *Consultative Group to Assist the Poor* estimates that for a micro-entrepreneur, the cost of servicing his or her loans is small compared to other business costs. As an example, CGAP (2002a) refers to a study covering Chile, Colombia, and the Dominican Republic where it is found that a monthly borrowing rate of 6% (which corresponds to an annual interest rate of 100%) only represents 3.4% of the micro-entrepreneur's total costs. Finally, when it comes to the MFIs, i.e. the middle-hands, it is likely that microfinance CDOs, as well as other structured products, could facilitate for them to secure long-term funding in large amounts at known interest rates. This would be a very important advantage for these institutions and it would probably mean better terms also for the ultimate microborrower.

The MiCDO can be tailored to provide securities with various risk-return profiles and therefore attract investors with very different risk appetite and investment mandates The tranche structure of a CDO defines the different risk-return possibilities available for the investors. Both the number of tranches and the thickness of the tranches is important, and the senior tranches become more insulated against defaults in the underlying loan pool the thicker the more junior tranches are. If we refer to the example above, this increased creditworthiness means that the expected loss for the senior tranche holders decreases

with increasing equity (and mezzanine) tranche thickness. In our example this is illustrated in Table 1 where the first-loss/second-loss tranche thickness is varied between \$3 million and \$15 million (out of a total MiCDO nominal amount of \$50 million) and the expected loss of the senior tranche decreases from 0.036% to $2.8 \cdot 10^{-27}\%$ if the MFIs are independent of each other. An important lesson to learn from this is that while the expected loss for each individual MFI-loan in the MiCDO is 5%, the senior tranche is almost completely insulated against default losses already at a first- and second-loss tranche thickness of \$3 million (expected loss = 0.036%). For the most conservative tranching the expected loss is essentially zero and the purchase of such a CDO tranche is consequently extremely safe despite the fairly large default probability (5%) of the individual MFI. The mezzanine tranche, in turn, is fairly risky for the thinnest tranche case (expected loss = 12.7%) but already at a tranche thickness of \$5 million is the expected loss significantly reduced (expected loss = 1.07%) compared to the average pool risk. Of course, someone has to bear the credit risk in the underlying pool and that is the equity tranche holder. The expected loss (and the associated approximate credit spread) for the equity tranche varies from 70.1% to 16.7% and the resulting credit ratings, referring to *Moody's* Idealized Loss Rates Table, vary from Caa3 to Caa2 for the various tranche thicknesses. These sub-investment grade ratings can be compared to the ratings for the senior tranches (Caa1 to Aaa for the mezzanine tranche and A3 to Aaa for the senior tranche). Consequently, regardless of how the exact tranching is done, the significant risk of the equity tranche would attract completely different investors than the senior tranches. Note that the \$3 million tranche deal generates less absolute losses for the equity tranche holder than the more conservative \$5-15 million tranchings. Seen from the perspective of the equity tranche's nominal amount (\$3, \$5, \$10 and \$15, respectively), however, the \$3 million equity tranche deal is by far the most risky deal for the equity tranche holder.²⁸

²⁸ With an increasing tranche thickness the overall CDO structure appears to turn safer (the % expected losses of all

As we have seen, the tranching leads to an entire range of different risks and returns that are available for the investor (such as the expected tranche losses of 48.9%, 1.1% and 0.000089%, respectively, for the \$5 million equity tranche case) and this should improve the possibilities for the originator to attract investors compared to the offering of a non-tranched securitization. This is the essence of tranching and it can also be exemplified by the tranche ratings; despite the individual MFIs all having B2 ratings, the various tranches can be designed to have ratings that stretch across the entire rating spectrum from Caa3 to Aaa. The actual tranche structure can of course be varied in infinitive ways, but ultimately it will most likely simply be chosen by the originator to maximize the attractiveness of the MiCDO.²⁹

All the results in Table 1 assume a 5% default probability of the individual MFIs and, importantly, if the probability instead was estimated to be a much lower, but still fairly realistic 1%, the expected losses of the investors would of course be significantly lower. The mezzanine tranche, for instance, would be almost risk free already at a tranche size of \$3 million (expected loss = 0.06%). The default probability estimate is therefore critical for an investor and a less conservative estimate can significantly boost the risk-adjusted return compared to the return suggested by the originator's tranche rating. Exactly the same situation holds for the default correlation estimate and the results in Table 1 are valid only if we have independent MFIs (zero default correlations between the MFIs in the CDO). A different correlation

the three tranches fall). This is an illusion, however, since the weighted average % expected loss across the three tranches (using the tranches' nominal amounts as weights) always remains at 5%, regardless of how the tranching is done. The reason is that the junior tranches' share of the entire CDO increases with tranche thickness and that their larger expected losses therefore have a larger impact on the entire structure.

²⁹ In this context, one could also mention the recent fast growth of so called single-tranche CDOs and the possibilities they could open up in the microfinance world. Single tranche CDOs only issue one class of asset-backed securities and one of the advantages of these instruments is, reportedly, the much shorter time needed to place the CDO with investors. Even though the typical single tranche CDOs is a so called synthetic structure it might be possible to lend some of its features to microfinance securitizations.

estimate would change the results significantly (see below).

By retaining the most risky tranche the originator of the MiCDO can get a high risk-adjusted investment return at the same time as it solves the asymmetric information problem inherent in any securitization deal In addition to the fee-income discussed above, the microfinance CDO originator can also use the position as an informed CDO manager to make investment profits. By keeping the equity tranche on its own balance sheet, the originator not only retains most of the credit risk and associated return, but it also facilitates the placement of the more senior tranches. The reason for the latter is that by exposing itself to the lion share of the default risk in the underlying loan pool, the originator removes some of the concern the investor might have regarding an asymmetric information disadvantage. Simply put, if the originator decides to keep the grunt of the credit risk it is a clear sign to the investor that the originator is not simply pooling together and selling its worst MFI credits. There are reasons to believe that the size of the information asymmetry is particularly significant in the microfinance industry³⁰ and tranching could therefore potentially be a very important feature of a microfinance securitization. In an ordinary pass-through securitization deal there is no equally efficient way of solving the asymmetric information problem and this is an important argument in favor of the (more complex) MiCDOs compared to classical microfinance securitization deals. As a result, interest rates charged to the MFIs (and ultimately to the microborrower) could be kept at a lower level in the MiCDO deal.

The equity tranche in the MiCDO can be seen as an alternative to equity Today, microfinancing is mostly debt

³⁰ While ordinary CDO deals are done between rather similar financial institutions with similar information, such as Wall-Street investment banks, MiCDOs deals would most likely be engineered by microfinance specialists for a range of investors stretching from rich individuals to commercial banks via pension funds and government organizations. The ability to accurately assess the credit risk of a large number of small MFIs in the developing world in such a MiCDO is clearly much easier for the originator than for the investors.

based rather than equity based.³¹ There are many reasons for the lack of equity funding in the microfinance industry and one factor that efficiently hinders equity funding in this sector is a tradition of weak corporate governance and opaque accounting systems all over the developing world. Another, related, reason is the huge information gap between the fund raiser, i.e. the MFI, and the investor. In addition, in many developing countries there are no stock markets where shares can be publicly traded.

Now, the equity tranche of a CDO is to some extent similar to equity and it could therefore be an alternative to real equity. By retaining a part (but not all) of the equity tranche, the CDO originator could then also relax some of the investors' worries about opaque MFIs. Furthermore, the *Consultative Group to Assist the Poor* claims that investors in microfinance equity funds expect 5-10% returns (Silverman (2006)) and the return to the investor in the MiCDO equity tranche could easily be tailored to lie in the same range. Admitting that historical data on realized returns on traditional CDO equity tranches is scarce, Satz and Muessel (2004) nonetheless refers to studies citing average annual returns around 15%. Furthermore, the volatility of these returns are found to be fairly low (12-15%), and even more importantly, CDO equity seems to have a very low correlation with both equity and corporate bonds. Although these figures are somewhat uncertain, they, together with the low correlation of microcredit with traditional investment classes more generally, strongly support microfinance CDO equity as an attractive equity-like investment to include in an otherwise well diversified portfolio.

³¹ Some notable exceptions are *The responsAbility Global Microfinance Fund* (responsAbility (2005)) that partly (currently 6% of the fund) invests in MFI equity (the fund is a shareholder in *The ProCredit* MFI network), *ShoreCap International Ltd.* (ShoreCapInternational (2005)), a private equity company, that mainly makes equity investments in regulated MFIs, and *ACCION Investments in Microfinance SPC* (ACCIONInternational (2006)), an offshore portfolio company sponsored by the microfinance organization *ACCION International*, that invests long-term in MFI equity. A longer list of private entities making equity investments in MFIs can be found at the home page of *The Council of Microfinance Equity Funds* (CMEF (2006)).

MiCDO investors with better estimates of MFI default probabilities and correlations can profit on behalf of those with worse estimates and this could speed up the development of the entire microfinance industry More than ordinary bonds and securitizations, CDOs offer investors the possibility to profit from using better financial models than its competitors. Both default probabilities and default correlations among MFIs are crucial for the pricing of CDO tranches. However, the current state of portfolio credit risk modelling is still in its infancy and this leaves ample room for the individual investors to choose his or her own model. As we saw in the (simplified) example above, a change in default probability assessment of the individual MFIs from 5% to 1% changed the expected losses of the different tranches significantly. This phenomenon is even more important for the default correlation estimate where a small change in correlation can cause a significant change in how the credit risk is distributed across the different tranches. Although such "modelling risk" exists for all tranches, the model risk is more critical for the junior tranches and the creditworthiness of the senior tranches is in turn quite stable against model inputs. This could attract particularly clever investors to the more risky tranches at the same time as less advanced investors who invest in the senior tranches still, largely, are insulated against credit risk. This market segmentation, which is created by the tranching, could speed up the interest in microfinance funding.

An issue related to default correlation estimates and MiCDO pricing is the issue of large groups of MFIs defaulting at the same time and therefore potentially causing large losses to the investor. The tranching of an MiCDO could help to insulate senior tranche investors against rare "extreme" events causing such mass-defaults. Normally creditworthy micro-entrepreneurs and households could in extreme situations default *en masse* if their city, region or country suffered, for instance, from a natural disaster such as an earth quake or a tsunami. While investors in traditional securitizations would suffer huge losses from such an event the senior tranche holders

would avoid (most of) these losses at the expense of the junior tranche holders.³²

5.3. Possibilities for the future

China and India are two large countries that have the potential to provide investors with ample investment opportunities with no or limited currency risk China is the only large Asian country where microfinance is still pretty much dormant. One of the reasons for this is the long history of subsidized rural financing programs (Duval and Goodwin-Groen (2004)). Interest rate caps are also partly to be blamed for the retarded state of the Chinese microfinance industry and recent interest rate cap relaxations together with other policy changes might stimulate commercial microlending (ADB (2004)).³³ Lately, the Chinese government has officially encouraged microfinance as an effective tool to combat poverty (GlobalEnvision (2003)). This is encouraging seen from the perspective of the 800 million rural Chinese that have seen very little improvements in their living standard since the Chinese reforms started 20-30 years ago. 60 million farmers in China live on less than \$1 a day and reforms to meet the needs of the farmers are widely expected (GlobalEnvision (2003)). These reforms might gradually change the Chinese MFI landscape.

Of course, even if interest rate caps are not fully removed in China there could still be some room for MFIs to replace the interest income with fees and charges.³⁴ While this would leave the typical Wall Street microfinance investors unaffected, it would be unfortunate for the microborrower. The lack of transparency would almost certainly make it more difficult for the borrower

³² Such a mass-default situation is very interesting from a modelling perspective, not the least due to the fact that equity tranche holders normally profit (ex ante) from increasing default correlations at the expense of the senior investors (as long as no defaults actually are observed).

³³ Meanwhile, the microfinance industry has thrived in countries such as Indonesia and Bangladesh where no interest rate caps have been imposed (van der Linden (2005)).

³⁴ There are also individual examples of MFIs, such as the *Funding the Poor Cooperative*, that have got special permissions to charge interest rates that exceed the cap (Duval and Goodwin-Groen (2004)).

to compare the actual costs of different loans, and some clients could also be driven into the grip of moneylenders or be forced to return to inefficient social network borrowing.

The lack of currency risk is another factor that might speed up microlending and structured microfinance, both in China and in India. In countries such as China and India there are at least two reasons why currency risk associated with commercial microfinancing is likely to become less critical in the future. First, both in India and China there are very large potential pools of domestic investors that would be able to finance micro-entrepreneurs in domestic currency. Second, both the Chinese Renminbi and the Indian Rupee will eventually be considered international vehicle currencies at par with, or almost at par with, the US Dollar, the Euro and the Yen. This would make international investors equally willing to hold Renminbi and Rupees in their diversified currency portfolios as US Dollars and Euros.

In addition to MiCDOs referencing hundreds of MFIs, one could also think of MiCDOs referencing thousands of microloans directly As mentioned earlier, microloan securitization can be done at two levels; either directly at the MFI level where the MFI issues securities backed by the actual microloans, or indirectly by commercial banks or other (Wall Street) investment vehicles who pool together and securitize ordinary debt instruments issued by the MFIs. The microfinance collateralized debt obligation example in this paper is of the second indirect type.

Each of these two approaches to microfinance securitization has its problems, however. The development of direct securitization could be hampered by the extensive knowledge-base/technical knowhow that has to be built up in the often fairly small MFIs, and in the case of indirect securitization the small number of commercially viable MFI-issued debt instruments might create a need for multi-country MFI packages. The latter suffers from the problem of having to deal with many national legal-, institutional- and regulatory frameworks that might be incompatible with each other. In the case of direct securitization, in addition to the hurdle of trans-

ferring structuring knowhow to the originator-cum-MFI, a further disadvantage is that it could provide for less diversification to the investor than an indirect securitization. The size of direct CDOs would also necessarily be smaller than the indirect ones. At the same time, however, an advantage could be that the originator-cum-MFI could specialize in a certain type of borrower. This would be impossible for the originator in an indirect deal. The specialized MFIs would not only find it easier to assess the credit risk of its borrowers, but it could also have an easier time placing the CDO than if they were not specializing. Niche MiCDOs of various kinds could be issued; for instance "Jasmine" MiCDOs backed by small rice farmers in the Isaan province in North-Eastern Thailand, "Future-Metropolis" MiCDOs backed by small entrepreneurs in Chengdu in China or "Pure-Silk" MiCDOs backed by silk producers in northern Cambodia.

5.4. Issues to be dealt with for the future

Currency risk management techniques in developing countries need to be developed in order to link international capital market to microfinance An important risk in a multi-country CDO such as the one in our example is currency risk. This risk would ultimately need to be hedged but the availability of methods to do that (forwards, swaps, options, letters of credit, back-to-back lending etc.) is typically limited in developing countries. This is unfortunate since if the currency risk is borne by the MFIs, like in our example, they could lose substantial amounts of their intermediation profits if the currency risk is not properly hedged. Of course, the MFI could be compensated by paying a lower borrowing rate, as discussed above, but this would only protect the MFI against small and fairly typical currency movements. For instance, in our five-country example where the standard deviation of a yearly currency move is 4.7%, the MFI could typically risk lose amounts of that magnitude if none of the currency risk were hedged.³⁵ However, there is always the possibility of much larger currency fluctu-

³⁵ The MFI could of course also gain the same amount if its domestic currency appreciated against the US dollar.

ations against which the MFI would not be protected. The risk of such losses could significantly slow down the development of international capital market-based commercial microfinance, regardless of who would ultimately bear the currency risk.

In our example all the currency risk was assumed by the MFI. An alternative is of course for the investor to bear the currency risk. In our example, the investor is exposed to several currencies and the diversification this causes is important from a risk management perspective. If the investor, furthermore, is a large institution it is also possible that it can use advanced hedging techniques as well as its own balance sheet to further reduce its risk exposure. And, finally, it is worth mentioning that even though currency risk is of concern to both investors and borrowers, there might simply be other problems that dominate. For instance, in a survey made by the microfinance fund manager *BlueOrchard Finance SA* of potential MFI-candidates to include in their US dollar denominated microfinance CDO, only 8% answered that they would reject the deal due to concerns about currency risk (BlueOrchard (2002)).

Local capital markets and financial institutions in the developing countries need to be developed and linked to the microfinance industry Eventually, it would be beneficial if a substantial share of the funding for the poor came from domestic sources. A big challenge for the future is therefore to build local capital markets. For one reason, as long as there is no efficient currency hedging apparatus in place, someone always has to bear the currency risk in an international securitization deal. In addition, just like in today's developed countries there are efficiency gains to be made by arranging fund raising (and saving) domestically by local banks in local currency. The ultimate goal is also to extend ordinary financial services to the poor and in this development a natural first step could be for the mainstream banks to get involved in micro lending. The idea is of course that, one day, many of the micro borrowers will be ordinary bank customers.

6. Conclusions

In this paper we have discussed how modern vehicles from the world of structured finance and credit derivatives potentially could help speed up the growth of microcredit supply to micro-entrepreneurs around the world. Collateralized debt obligations (CDOs), and similar structures, have been suggested as particularly interesting tools and a numerical example of such a microfinance CDO was used to demonstrate the possibilities given by modern structured (micro)finance.

The potential of commercial microfinance is huge but so are the hurdles that have to be overcome. Furthermore, of course, it is obvious that the most credit risky microborrowers never will be able to get cheap commercial funding. They will continue having to turn to money lenders or their social networks. And one should never forget that microfinance is no panacea for complete poverty reduction. There will always be people whose basic needs have to be supported by specific development programs; either because they simply are too poor or because they for some other reason are unable to find an economic opportunity no matter how cheap the funding is. And, finally, there will of course always be people that never are reached by any safety net, no matter how fine-meshed the net is made.

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Table 1 Expected MiCDO tranche losses and Moody's credit ratings (from Moody's Idealized Loss Rate Table) for various first- and second-loss tranche thicknesses. The MiCDO is made up of three tranches (equity, mezzanine and senior) and it is assumed to contain 50 identical and independent \$1 million MFI-loans, each with an expected loss of 5%. The expected loss is given both in absolute \$ terms and as a share (%) of the tranche size.

	Expected Loss (\$)			
	Entire CDO	Equity Tranche	Mezzanine Tranche	Senior Tranche
First/Second-Loss Tranche Thickness: \$3 million	\$2.5 million	\$2.1 million	\$381000	\$16000
First/Second-Loss Tranche Thickness: \$5 million	\$2.5 million	\$2.4 million	\$54000	\$35
First/Second-Loss Tranche Thickness: \$10 million	\$2.5 million	~ \$2.5 million	\$35	~ \$0
First/Second-Loss Tranche Thickness: \$15 million	\$2.5 million	~ \$2.5 million	~ \$0	~ \$0
	Expected Loss (%)			
	Entire CDO	Equity Tranche	Mezzanine Tranche	Senior Tranche
First/Second-Loss Tranche Thickness: \$3 million	5%	70.1%	12.7%	$3.6 \cdot 10^{-2}\%$
First/Second-Loss Tranche Thickness: \$5 million	5%	48.9%	1.1%	$8.9 \cdot 10^{-5}\%$
First/Second-Loss Tranche Thickness: \$10 million	5%	25.0%	$3.6 \cdot 10^{-4}\%$	$2.8 \cdot 10^{-14}\%$
First/Second-Loss Tranche Thickness: \$15 million	5%	16.7%	$1.1 \cdot 10^{-8}\%$	$2.8 \cdot 10^{-27}\%$
	Moody's Ratings			
	Entire CDO	Equity Tranche	Mezzanine Tranche	Senior Tranche
First/Second-Loss Tranche Thickness: \$3 million	B2	Caa3	Caa1	A3
First/Second-Loss Tranche Thickness: \$5 million	B2	Caa3	Ba2	Aaa
First/Second-Loss Tranche Thickness: \$10 million	B2	Caa2	Aa1	Aaa
First/Second-Loss Tranche Thickness: \$15 million	B2	Caa2	Aaa	Aaa

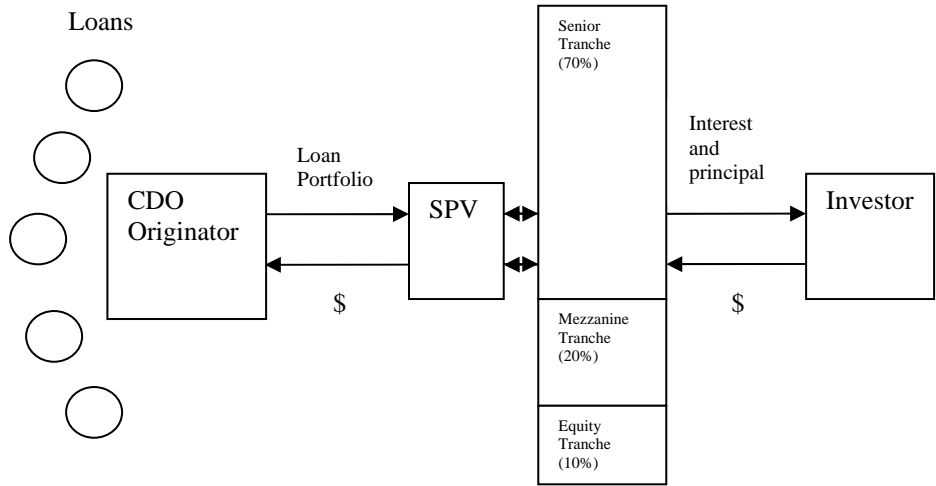


Figure 1. A typical CDO structure.